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AUTHORSHIP
OF THE
PRACTICAL ELECTRIC TELEGRAPH.
BY
THE REV. THOMAS FOTHERGILL COOKE, M.A.



4 Johnston St., Bath,
March 9th, 1882.

Sir,

Will you have the kindness
to insert at the beginning of
my pamphlet, 'Authorship of
the Electric Telegraph', &c, recently
forwarded to the Oxford University
Library, the enclosed lithographed
letter?

I am, Sir,

Yr. obed^t Serv^t

J. Fitzjell Cooke.

To the Librarian,

University Library, Oxford.



4 Johnstone Street, Bath,
March 7th, 1868.

To The Librarian.
University Library, Oxford.

Sir, Anyone connected
with the above-named Library, who, on
reading "The Brunel Award vindicated",
shall become convinced of the rightfulness
of the claims of my brother, Mr. William
Fothergill-Cooke, and shall insert a
notice to that effect in the London or Pro-
vincial Press, will confer a very great obligation.

The difficulty of obtaining recognition of the
truth on an old subject, with respect to which
the public mind has long settled down in
erroneous impressions, will be appreciated
from the following circumstances.

The Article in the Quarterly Review for June
1854, "prompted exclusively by Wheatstone"
in his own absolute and exclusive favour, has
operated powerfully; and was itself the sequel
to a long series of public notices to the same
effect, originating mainly from the same source.

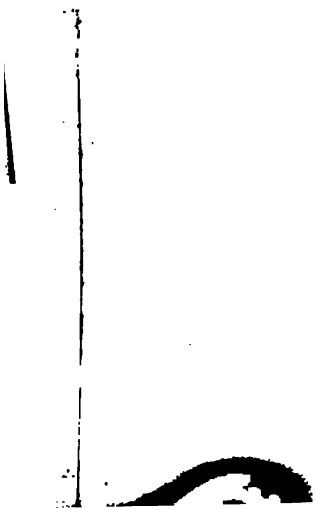
The Times, having in leading Articles on the 10th & 17th Oct., 1866, loudly demanded national honours for Professor, (now Sir Charles,) Wheatstone, as the sole and undisputed inventor of the Electric Telegraph, has remained sealed against every notice in a different sense to the present day - The letter of the eminent electrician, Mr. Cromwell Varley, (given in extenso, pp 69-71,) was refused, amongst other similar letters, by The Times, before it appeared in the Dublin Express; and I have myself very recently addressed two letters to the former journal, both of which have been declined.

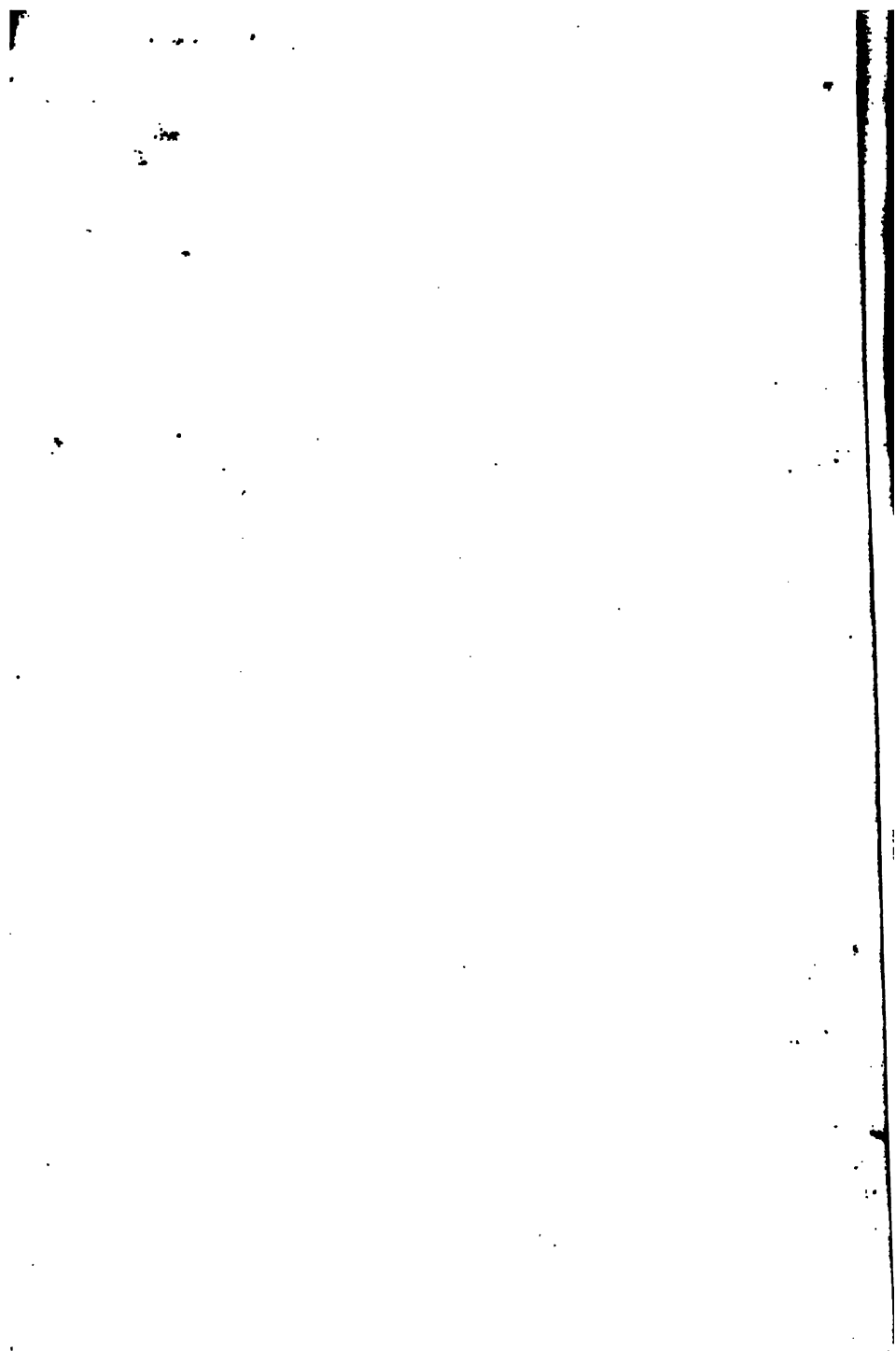
Moreover, the unfounded claims of Sir C Wheatstone are still supported in scientific quarters with power almost overwhelming.

Should such a notice as requested be inserted in any newspaper, I should also be greatly obliged by being favoured with a copy of it, as it might otherwise escape my observation.

I have the honour to be,

Sir,
Your very obedient Servant,
J. Fothergill-Cooke







THE ELECTRIC TELEGRAPH,

WAS IT INVENTED BY

PROFESSOR WHEATSTONE?

BY

WILLIAM FOTHERGILL COOKE, ESQ.

THE PAMPHLET OF 1854;

FOURTH EDITION, 1866'.

ALSO,

In Two Vols., Imperial Octavo, Illustrated by numerous Plates.

VOL. I.—PAMPHLETS OF 1854—6.

VOL. II.—ARBITRATION PAPERS.

LONDON :

SOLD BY W. H. SMITH AND SON, STRAND.

1857.

AUTHORSHIP
OF THE
PRACTICAL ELECTRIC TELEGRAPH
OF
GREAT BRITAIN;
OR,
THE BRUNEL AWARD VINDICATED;
IN VII. LETTERS,
CONTAINING EXTRACTS FROM THE
ARBITRATION EVIDENCE OF 1841,
EDITED IN ASSERTION OF
HIS BROTHER'S RIGHTS.
BY
THE REV. THOMAS FOTHERGILL COOKE, M.A.

"While philosophers were playing with the telegraph, and exhibiting it as a 'possibility,' Mr. Cooke grasped the electric toy, and converted it into one of the subtlest and most valuable agents the world has ever beheld."—CROMWELL F. VARLEY, *Dublin Express*, Nov. 21st., 1866. (Page 71.)

"Mr. Cooke, who, far more even than Wheatstone, deserves the title of father of the Electric Telegraph, will assuredly ever maintain the *première niche* in the rôle of the scientific and mechanical benefactors of the human race."—*Engineering*, Feb. 15, 1867. (Page 94.)

R. E. PEACH, BATH.
SIMPKIN, MARSHALL & CO., STATIONERS HALL COURT,
LONDON.

1868.

196. e. 8.

[These LETTERS were intended to appear in a well-known Literary Journal. Before the second letter was in print, circumstances arose which prevented that intention from being carried into effect, and it was then resolved by my brother's friends that a wider and more lasting publicity would be attained by publishing them in the present form. T. F. C.]



THE ELECTRIC TELEGRAPH.

EDITOR'S PREFACE.

CONTENTS.—The friends of WILLIAM FOTHERGILL COOKE take up his cause. (*See also pp. 3, 4, and 52.*)—COOKE's claims as ORIGINATOR of the Telegraph established by law, binding by acceptance. (*Also pp. 1 and 12.*)—Evidence printed on suggestion of COOKE's Arbitrator "to facilitate enquiry," One thousand copies burnt on requisition of WHEATSTONE's "to prevent publicity." (*Also pp. 4, 49, and 53.*)—Long and obstinate struggle before Arbitrators. (*Also pp. 11, 12, 18–20, and 34.*)—COOKE's Priority of Name and Position in Patent, Legal Agreement, and Award, (*Also pp. 14–20,*) "COOKE entitled to stand alone;" sustained by Judgment of Arbitrators, and by Cordial acceptance of the Litigants. (*Also pp. 1, and 14, 15.*)—Influence of "a known name" (forced before the Public) on General opinion: Times' Leaders: (*Also p. 2:*) Quarterly Review, "prompted exclusively by WHEATSTONE," ignores COOKE.—The "Telegraphic Idea," a "Scientific Toy," till "The Right Man came:" "Soixante deux Prétendants."—COOKE's the "Energic nature and Shaping mind;" WHEATSTONE's the "Skilled scientific co-operation." (*Also p. 42.*)

It is deeply felt by the friends of Mr. William Fothergill Cooke, among whom, by ties of blood and affectionate attachment, I, his brother, claim to stand foremost, that the periodical attempts of Professor Wheatstone and his ill-advised advocates to deprive him of his admitted position, as the Originator and Practical Introducer of the Electric Telegraph, as a new Institution of Civilization, must be henceforth rendered impossible.

After mature deliberation, and a careful mastering of all the details of the case, we have resolved to do our utmost to shield Mr. W. F. Cooke from the recurrence of this wearying injustice, that he may be left in peaceful possession of his well-earned honours.

As the most effectual, if not the only, means of permanently securing this result, we believe it to be our duty to place the Arbitration Evidence, (however painful its revelations,) in a condensed and easily accessible shape before

the PUBLIC; and also the more important features of the pamphlets of Messrs. Cooke and Wheatstone, in which they speak for themselves.

A short compendium of the circumstances, arranged in Letters under distinct heads, with ample references for verification to my brother's volumes, (in which everything is stated in full,) will be most easily mastered by the general reader now, and—should the *vexata quæstio* be again unwisely re-opened—hereafter. With this flying column of admitted facts always in hand, we hope either to prevent, or effectually to check, any future departure from the allegiance due alike by law and honour to the "BRUNEL AWARD." See AWARD, p. xxvii.

The decennial recurrence of these unfounded pretensions is intolerable; and if the Letters containing a Digest of the Evidence be thoughtfully read, it seems impossible that, in a Country where the love of fair dealing is proverbial, the erroneous popular impression, hitherto so widely spread, should long survive.

The establishment of the claim of WILLIAM FOTHERGILL COOKE, as the Original "Shaper and Introducer" of the Electric Telegraph* with that detailed practical system which has rendered the subsequent adaptation of any new form of "signal-giving apparatus" easy, as a mere "joining up of wires,"—the establishment of that claim, be it understood, is *not* the object

* The Award says to whom "*this country*" is indebted. Mr. Cromwell F. Varley, in his published letter of November last, extends this claim, "To whom *Europe* is indebted." "*Engineering*," in the number for February 15th, makes the claim absolute; "To whom *the World* is indebted," including America.

"This Country" was the only Country, in which practical Telegraphy was introduced at the date of the Award. And on Dr. Hamel's authority we learn that Mr. Samuel Morse, of America, dates back his *idea* of an Electric Telegraph to 1832, and seems not to have known that the *idea* had existed for a century before. His signal apparatus—original, simple, and highly meritorious—was worked out gradually, and very much later. It was not till 1844 that the first Telegraph-line from Washington to Baltimore was completed; when, on the 24th March, the first short telegram of four words, (dictated by a Miss Elsworth, and still preserved in the Historical Museum at Hartford, Connecticut, *as the first*,) announced the existence of a Practical Telegraph on the American Continent. This was just five years after the Great Western Railway Telegraph was at work daily between London and Drayton; and after the varied experience of England was known and studied, both in Europe and America; and three years after the "Brunel Award" was made publicly known.

of this publication. Its object is simply to enforce upon the public mind the fact, that that claim *is already fully established*; and, at the same time, to give such information as may cause the weight of *the Judicial Verdict*, which established it, to be duly appreciated.

THE ESTABLISHMENT OF THAT CLAIM WAS EFFECTED IN 1841, ONCE FOR ALL, BY THE AWARD OF SIR I. BRUNEL AND PROFESSOR DANIELL. See AWARD, p. xxix.

No element was wanting to clothe that Award with the character of A FULL, FINAL, AND SATISFACTORY JUDICIAL VERDICT—A VERDICT binding both in law and in honour, as between my brother and Professor Wheatstone; *against whose united claims no rivalry from without can be sustained.*

THE ARBITRATORS WERE DISTINGUISHED MEN. The name of SIR MARC ISAMBARD BRUNEL is eminently distinguished in the world of practical science. That of PROFESSOR DANIELL is one of very honorable distinction in the world of abstract science.

These eminent men had before them, at the time of the Arbitration, THE MOST AMPLE PRINTED EVIDENCE, TOGETHER WITH MODELS AND DRAWINGS, to guide them in their well-weighed decision; *—every step towards which was earnestly contested by my brother as Plaintiff, and by Professor Wheatstone as Defendant. THEIR DECISION WAS GIVEN IN LEGAL FORM, UNDER THEIR LEGAL SIGNATURES, as a "*Statement of Facts*, which either party might at pleasure make publicly known."

AS A PORTION OF THE AWARD, THE LITIGANTS, in ratification of the judgment, WERE REQUIRED TO SIGN IT :—Their subscribed acceptance is in these words,—

* It has been pretended that the Arbitrators knew but little of the Evidence; nothing can be more unfounded.

Sir I. Brunel writes to Mr. Wilson, March, 5th, '41, "I have directed Mr. Law to make an exposition of the facts and evidences, in such manner as to be like Debtor and Creditor account. Mr. Daniell concurs in this plan with me. In a few days we shall be ready." Vol. I., p. 207.

"We cordially acknowledge *the correctness of the facts* in the above document, and beg to express our grateful sense of the very friendly and gratifying manner, in which you have recorded your opinion *of our joint labours*, and of the value of our invention."

I here emphatically repeat that WILLIAM FOTHERGILL COOKE AND CHARLES WHEATSTONE WERE BOUND, BOTH IN LAW BY THE AWARD, AND IN HONOUR BY ITS CORDIAL ACCEPTANCE, TO RESPECT THIS VERDICT.

THE DEED of November 16th, 1840, by which the Arbitrators were appointed, and the conditions of the Arbitration defined, WAS A STRINGENT LEGAL DOCUMENT. Mr. Wheatstone tells us that, in reply to my brother's appeal to Arbitration, he himself "wrote granting, or rather demanding the Arbitration, *and requiring that it should be made binding by the proper legal forms.*" (Answer, vol. i., p. 74.) The interval, *of more than five months*, which elapsed between the signing of this document and the signing of the Award, points, not obscurely, to the deliberate character of the latter.

THE FULL, CUMULATIVE, AND COGENT EVIDENCE, on which the Arbitrators established their "*Statement of Facts*," (however little notice that Evidence may hitherto have attracted, however generally its very existence may be unknown,) has now been for more than ten years before the public. In 1841 the mass of the Arbitration Edition of 1000 copies was burnt, on the requisition of Mr. Wheatstone's Arbitrator, *to prevent publicity*.* Only six copies were reserved; viz., three by Professor Wheatstone, his Arbitrator, and Solicitor; and three similarly distributed on my brother's side. In 1856,

* The history of the PRINTING, and of the BURNING, of the original 1,000 copies may be gathered from the following Extracts.

The *Printing* is explained by my brother's letter to the Arbitrators, March 30, 1841; which runs thus:—"As you consider the written papers, laid before you by Professor Wheatstone and myself on the 27th ult., are likely, from their length, to occupy more of your time than you can conveniently devote to them, *I have, at Mr. BRUNEL's suggestion, printed them entire*, with marginal references. I shall not regret the heavy expense thus incurred, *if it prove the means of facilitating your inquiries into the facts and evidence on which I rest my appeal to you.*" Vol. i., p. 208.

"I printed 1,000 copies, because I had learnt from Sir I. Brunel that there was a disposition, after my Case was out, to swamp the whole enquiry. It was my intention, if the arbitration had been discontinued, to publish the papers far and wide. This course was justified

in answer to the article in the "Quarterly Review," a reprint was issued by my brother from one of those reserved copies. It is a Digest of that original Evidence, reprinted in '56, which is now presented to the public in these pages.

Neither did this Arbitration terminate, as Mr. Wheatstone and his friends represent, in an "*amiable and unmeaning compromise*," to be now alighted as "*a quarter of a century old*." IT WAS FOUGHT OUT SENTENCE BY SENTENCE—FOUGHT OUT KEENLY AND DEFIANTLY TO THE LAST;—AND THAT UNDER CIRCUMSTANCES MOST FAVORABLE TO THE ELUCIDATION OF TRUTH.

My brother writes to Professor Daniell on the 26th of April, the *very day* before the Award was signed, in these resolute and independent words:—

"At the last meeting the Arbitrators expressed strongly their desire to promote an amicable settlement.† I was requested, as Plaintiff, to state what I claimed—I claimed the least which I can be expected to accept—Professor Wheatstone has adopted the greater portion of it, but he has *transposed the paragraphs so as to give precedence to his name*. TO THIS I CANNOT CONSENT. The scientific field I have left open to him in the most liberal spirit. I have

by the Arbitrators on the question of costs; one half of which they awarded, in confirmation of MY PROPOSITION, as a deduction from Mr. Wheatstone's share of proceeds." Vol. i., p. 209.

An *Agreement* to place the impression at the disposal of the Arbitrators was made immediately after the signing of the Award:—"27th April, 1841.—It was this day *agreed between the parties*, with the sanction of the Arbitrators:—That the printed papers be placed at the disposal of the Arbitrators, who have consented to return the other documents to the parties." Memorandum, vol. i., p. 160, *note*.

The *Burning* is provided for by Mr. Wilson's letter to Sir I. Brunel, May 1, 1841:—"Mr. Daniell has desired me to send you the printed copies of the papers (*retaining a few copies for the present*), with a request that you would burn them in your furnace. *I think it is very important* that you should place them in the hands of some confidential person who will destroy them all." Vol. i., p. 160, *note*. This was done.

In 1854 the Article in the Quarterly Review, "prompted exclusively by Wheatstone," revived the old stories of his Case, which the Arbitrators had condemned to oblivion. He had evidently forgotten that "A FEW COPIES OF THE PRINTED EVIDENCE HAD BEEN RETAINED," and "the other (THE ORIGINAL) documents returned." In 1854 the Arbitrators were deceased.

† Mr. Wheatstone in his "Answer," vol. i., p. 77, with his usual inaccuracy, misrepresents this *documentary* Fact; and, to gain a petty point, says:—"Mr. Cooke had made proposals for an amicable arrangement, . . . (and various reasons) . . . induced Mr. Wheatstone readily to listen to Mr. Cooke's proposals."

introduced Mr. Wheatstone's summary of his researches, and some other of his expressions. I BEG THAT THESE MAY BE RECEIVED AS MY FINAL PROPOSITIONS." Vol. i., p. 18, *note*.

"Mr. Wheatstone's transposition of *paragraphs* was reversed accordingly, and he was obliged to take the second position for his *discoveries* as well as for his *name*. The Professor's more intimate friends will feel that the surrender was not, in either case, a trifling one." Vol. i., p. 140.

This further humiliation was the fruit of his own act in his last struggle for "Priority."

Moreover, THE AWARD WAS A COTEMPORANEOUS JUDGMENT, when the facts were recent, and all capable of proof by living Witnesses.

It was also A JUDGMENT UPON THE WHOLE CASE. From the date of the Award in '41, until the time when my brother handed over a large, established, and thriving, business to the Electric Telegraph Company in '45, he stood almost alone, latterly quite alone, in the development of the great undertaking. And after the latter date his great energies were not less successfully exerted as a leading Director of that Company.

And further than this. The value of the Award will not be duly estimated, unless it be borne in mind—that it was THE MINIMUM, WHICH MY BROTHER, AS PLAINTIFF, CONSENTED TO ACCEPT;—that in whatever was admitted into its Statement of Facts it was designed, either TO CORRECT PREVAILING MISREPRESENTATIONS, TO RATIFY UNDISPUTED TRUTH, OR TO GIVE JUDGMENT BETWEEN CONFLICTING PLEAS;—that the moderate terms employed were "GRATIFYING" to my brother, as not being "UNNECESSARILY LOWERING to Mr. Wheatstone;" (LETTER vii., p. 53;);—and finally, that when Professor Wheatstone, under the eye and dictation of his judges, accepted with expressions of cordial gratitude this escape from "*the arbitration Mr. Cooke had called for*," there still lived among FORTHCOMING WITNESSES, whose names are recorded in the arbitration volume,* Mr. HOPFNER, who assisted my brother in the construction of his first instruments at Heidel-

* ADDRESS, laid before the ARBITRATORS by MR. WILSON, on Saturday, the 27th February, 1841. Vol. ii., p. 120.

berg,—Mr. LANE, in whose chambers, and in whose *presence*, the “terms of partnership” were *discussed* and *settled*,—SIR BENJAMIN HAWES, the sole Arbitrator in that first arbitration, which Mr. Wheatstone's impracticable nature had rendered *necessary, to enforce the terms of partnership*, so early as November, 1837,—and MR. FAREY, by whom the specifications of the various patents were drawn up.

While relying upon the course now adopted to ensure the final and complete victory of truth, we are not insensible to the difficulty of eradicating a wide-spread and long-established delusion, natural, it is admitted, at its commencement, from “connexion with a well-known name,” and continually fostered by the pervading influence of the scientific member of the London coteries, who has condescended in his own interests, through anonymous writers for the press, to mislead its responsible representatives, and through them the whole reading public. *See LETTER vii. throughout.*

My brother has never hesitated in private to exonerate the Editors of the “Quarterly Review” and of “The Times” from any wanton and intentional injustice. Yet those two publications have propagated more widely and more effectively, than all other organs of the press together, a *gross* misrepresentation of the truth in favour of Mr. Wheatstone, and to his own great and serious prejudice.

My brother can prove how the former was misled. He *knows* that the Editor of the “Quarterly Review” relied unsuspectingly on the correctness of the statements in the article, BECAUSE

“THE AUTHOR OF THE ESSAY WAS PROMPTED EXCLUSIVELY BY WHEATSTONE,—(that he) THOUGHT THE CLAIMS OF FOREIGN DISCOVERERS UNDER-RATED,—(that he) STUDIED THE QUESTION, AND ENDEAVOURED TO STATE IT WITH PERFECT TRUTH,—(but that he) NEVER CONSIDERED THE QUESTION AS BETWEEN COOKE AND WHEATSTONE, FOR THE SIMPLE REASON, THAT HE DID NOT KNOW THAT THE FORMER EVER DISPUTED THE PRETENSIONS OF THE LATTER.”*

* This Extract is taken *verbatim* from a letter, which a kind of *literary etiquette* at present withholds from publication, until demanded from the proper quarter. But if “the Professor

Let the reader notice this:—In an article prompted exclusively by Professor Wheatstone, the figure of Professor Wheatstone “stands alone” before the practised eye of the Editor, while revising that article for the press, and while actually doing justice with his own pen to certain “foreign inventors,” whose “claims,” being known to him, he further “studied,” and found “underrated.” To those unacquainted with the article, this simple fact will be equivalent to its contents.

Could this utter ignoring of his Partner's name, to whose *priority*, as the Originator and Developer of Practical Telegraphy he had solemnly subscribed, have been predicted as possible in a Scientific History of the Invention of the Electric Telegraph, “prompted exclusively by Wheatstone” for an article in the “Quarterly Review?”

If, as in simplest justice bound, he had communicated the Brunel Award, which he substantially inverted, the Editor would probably have drawn his pen through all the rest. A precisely similar cause of complaint will be found in LETTER v., p. 30, when to Mr. Wheatstone had been confided the business of presenting the inventions of the partners for specification in the first patent. Vol. i., pp. 181—3.

The Professor writes evasively:—“Mr. Wheatstone is not responsible for *every minute statement* in a recent number of the “Quarterly Review.” (Answer, vol. i., p. 86.) True.—Foreign inventors were indebted for just recognition, not to Mr. Wheatstone, but to the Editor. But will Professor Wheatstone now drop these “*minute statements*,” and deny responsibility for the article, AS A WHOLE?

His sense of responsibility, as here gauged, throws back a broad light on the circumstances which led to the arbitration of 1841. Almost from the date of the partnership, in the frequent notices of the Electric Telegraph, as the then novelty of the day, both in home and foreign publications—notices often

and others, who should be the first to demand my brother's proofs, now shrink from a manly duty, the day nevertheless will come when no false delicacy or reserve shall keep them from the light, if openly—or clandestinely—my brother's ‘awarded’ rights should be again assailed.” Letter vii., p. 54.

purporting to be informed by the Professor—just that occurred which occurred years afterwards in the “Quarterly,” Professor Wheatstone “stood alone.” In my brother’s letter to him of November 6, 1866, (a published and unanswered letter,) we find the result of a long series of appeals to his good feeling to correct this misunderstanding. My brother writes, “You spoke fairly, but did nothing; till at last you threw off the mask;” In “throwing off the mask,” he attempted to dispose in mass of these published anticipations of the “Quarterly” article by the loose expression, “*They might be right, or they might be wrong, he had given them no sanction.*” Vol. i., p. 113.

The arbitration with its clear correction of this “MISUNDERSTANDING WHICH HAD PREVAILED,” (Award, p. xxvii.,) was the result.

My brother is not so unreasonable as to expect that public journals and periodicals will contradict off-hand their own foregone conclusions, or without careful examination of the evidence adduced in support of views antagonistic to those which they have advocated. But he does confide—and confide justly—in this, that eventually, with that evidence before them, the public Press will not hesitate to declare and to maintain the Truth.

Already, during the last few weeks, since the *advertised Award* has attracted attention, many publications scattered about the country boldly take up my brother’s side, or impartially examine his claims. This favourable movement must not be permitted to die out.

On the value of Electric Telegraphy, since it has been realized, there is no dispute. In loudly proclaiming “One of the greatest and most beneficial achievements of which history tells,” by which “The whole civilized world is now brought within an instant of time;”—in loudly proclaiming the great national obligation to discover, and practically to recognize, its meritorious Author,—“The Times” has done its work well. It has been well said, “Since the introduction of printing, there has not arisen an agency so beneficial and ubiquitous.”

Again, “The Times” has well said, “Nobody can gainsay the claim of the Public to be heard on the rights of discovery.”

It was my brother’s manly duty, in fearless self-respect, and in his own

name, *to establish the truth of his claims*.—It is now the accepted duty of us, his friends, who have rallied round him in support of his righteous cause, to make the truth of those claims familiar to our fellow countrymen as facts; not as the mere *Rights of Discovery*, but as those of the *Origination and Practical Introduction* of this “beneficial agency,”—this boon to civilization, “*not for an age, but for all time*,”—this “most marvellous realization of science ever offered to civilized life,”—a boon so long “toyed with” in the laboratory and the lecture room,* so rapidly realized, when “The right man” came.—It is our duty no longer quietly to suffer the world-wide proclamation of “*another name alone, another name instead*.”

In the Brunel Award, as in the following pages, my brother appears, not only as the combiner of the long published scientific discoveries of others into various original “signal-giving instruments”† of the most practical character, before he became acquainted with Professor Wheatstone, in 1837, but also as the sole worker out of the entire practical Telegraphic system from the first. In this department he had no coadjutor till after nearly ten years the Electric Telegraph Company was formed, in 1845. In this department he never received or asked, either assistance, or advice, from Professor Wheatstone.

On the general merits of the question we are quite disposed to adopt, as quite in harmony with the Award, and with all, which my brother has ever claimed, the carefully-balanced views of an able writer in a recent number of the “Spectator,” as thus expressed:—

* There was a very generally indulged disposition amongst scientific men, (to whom Professor Wheatstone was no exception,) to hasten into print with their ideas on Telegraphing by Electricity.

“Remarquons d'abord qu'il n'est guère de physicien à qui l'idée ne se soit présentée d'employer l'électricité comme moyen télégraphique, et que le plus grand nombre de ces physiciens ont cédé au désir de donner de la publicité à leurs procédés. M. Wheatstone disait en 1838 à M. Quetelet qu'il avait déjà recueilli pour sa part les noms de soixante-deux prétendants à la découverte. Moigno, p. 75;” vol. i., p. 154.

† In the invention of “signal-giving instruments,” Messrs. Cooke and Wheatstone had, *inter alia*, many successful rivals.

“Professor Wheatstone must have been qualified to bring to bear scientific principles and experiments, which Mr. Cooke could not supply single-handed, or the latter had no conceivable motive for seeking him as a partner in his undertaking. On the other hand, that undertaking must already have assumed a substantive shape, and must have presented itself with ‘a provoking probability of success,’ or Professor Wheatstone would have had just as little motive for partnership as Mr. Cooke. We must suppose Professor Wheatstone’s skilled scientific co-operation to have been highly important to the speedy successful carrying out of the practical enterprise first started in that shape by Mr. Cooke; but we cannot suppose the ‘energetic nature and shaping mind’ of the latter to have had less of motive force in the detailed conduct of the enterprise, than they undoubtedly had in the first determined pursuit of it as a practical enterprise at all. ‘Many philosophers,’ says Mr. Varley, with truth, ‘have invented electric telegraphs; many had foreseen their great use; but the one man of indomitable energy, perseverance, and foresight, who took the matter up, and forced the public into its recognition, is undoubtedly William Fothergill Cooke.’” See EXTRACT xxvii., p. 91.

T. F. C.

The Chesnuts, Guildford.

March 4th, 1867.

1

THE ALBERT GOLD MEDAL OF THE SOCIETY OF ARTS.

NOTICE TO THE READER.

THE delay which has occurred in publishing these LETTERS, and the cause of their ultimate publication, require to be explained.

THE LETTERS and PREFACE (the latter of which is dated March 4th, 1867), were already printed in the spring of the present year, when their publication was arrested by a rumour which reached Mr. Cooke's friends of the intended award of the above-named Medal. That rumour was substantiated a few weeks afterwards by the subjoined letter, addressed by the Secretary of the Society of Arts to Mr. W. Fothergill Cooke :—

“ Society for the Encouragement of Arts, Manufactures,
and Commerce,

John Street, Adelphi, London, W.C.,

2nd May, 1867.

“ SIR,

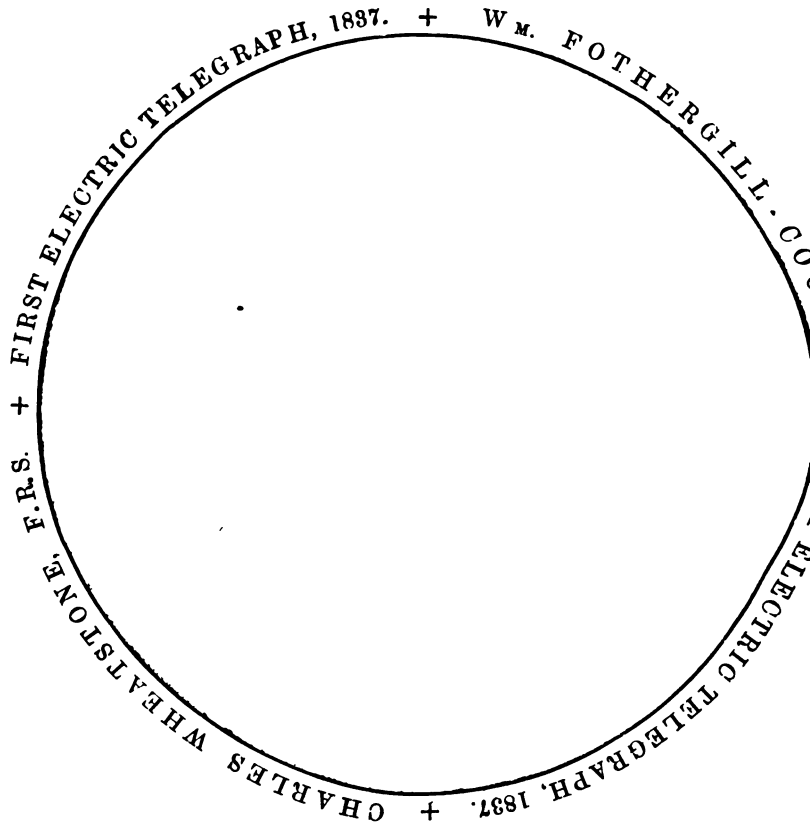
“ I have the pleasure to inform you that the Council of this Society have passed the following resolutions :—

“ Resolved unanimously—

“ That the Albert Medal be awarded to Wm. Fothergill Cooke, Esquire, and Professor Charles Wheatstone, for their joint labours in the introduction of the Electric Telegraph.

ALBERT GOLD MEDAL.

"That the Medal be prepared in duplicate, and the inscription be in the words and manner following, viz. :—



"I have the honour to be,

SIR,

Your obedient Servant,

P. LE NEVE FOSTER,
Secretary.

"Wm. Fothergill Cooke, Esq."

ALBERT GOLD MEDAL.

This letter was followed by the subjoined official announcement of the Vice-President, published in the Society's Journal on the 28th of June:—

“THE ALBERT GOLD MEDAL FOR 1867.

“The Albert Gold Medal has this year been awarded to W. Fothergill Cooke, Esq., and Professor Charles Wheatstone, F.R.S., in recognition of their joint labours in establishing the first Electric Telegraph.

“It will be remembered that the first Albert Medal was awarded, in 1864, to Sir Rowland Hill, K.C.B., ‘for his great services to Arts, Manufactures, and Commerce, in the creation of the penny postage, and for his other reforms in the postal system of this country, the benefits of which, have, however, not been confined to this country, but have extended over the civilised world.’ The second medal was awarded, in 1865, to His Imperial Majesty the Emperor of the French, ‘for distinguished merit in promoting, in many ways, by his personal exertions, the international progress of Arts, Manufactures, and Commerce, the proofs of which are afforded by his judicious patronage of Art, his enlightened commercial policy, and especially by the abolition of passports in favour of British subjects.’ The third medal was awarded, in 1866, to Professor Faraday, D.C.L., F.R.S., for ‘discoveries in electricity, magnetism, and chemistry, which, in their relation to the industries of the world, have so largely promoted Arts, Manufactures, and Commerce.’

“The Council think it right to remind the members of these several awards, in order to keep in their recollection the very high standard of merit which they are intended to mark.

“In making the award this year, the Council were placed in a somewhat peculiar position, inasmuch as by the terms upon which the medal was established they could only make one award, whilst

ALBERT GOLD MEDAL.

the great object accomplished was due to the combined labours of two men. They felt, however, that so great a national work as the Electric Telegraph was especially worthy of reward by this Society, and that the Albert Medal could not be more worthily bestowed than in recognition of the services of those to whom the introduction of the Telegraph was due. The award having been made, they have directed that the medal be struck in duplicate, and a copy, with a suitable inscription, be presented to each of the above-named gentlemen. The Council feel assured that in selecting the introduction of telegraphy for the award of the Albert Medal, they will have the unanimous concurrence of the members of the Society."

On the 19th of November, at the first meeting of the Session of 1867-8, the Vice-President followed up this announcement by addressing his audience in these words:—

"The Gold Albert Medal, which I shall have the honour to present this evening, has this year been awarded to Messrs. Cooke and Wheatstone for the energy, scientific knowledge, and practical skill, with which they overcame the great difficulties incidental to the successful introduction of electric telegraphy not only in this country but all over the world.

"You are aware that the first Albert Medal was presented to Sir Rowland Hill, the second to the Emperor of the French, and that of last year to Dr. Faraday; it therefore appeared to the Council that the almost natural sequence of such awards to the originator of penny postage—to the promoter of free intercourse, personal and commercial, between two such great countries as France and England, the first in arts, manufactures, and commerce in the world—and to the philosopher to whose inquiries into the phenomena of electrical science, and especially as applied to electric telegraphy, the world owes so much—was the presentation of the

ALBERT GOLD MEDAL.

Gold Albert Medal of 1867 to those by whose energy and genius and by whose application of scientific principles to this most difficult subject the invention and practical application of the electric telegraph to the daily wants of commerce and social life were eminently due."

The presentation of the Medal to Mr. Fothergill Cooke, is thus recorded in the Society's Journal for November 22nd :—

"The CHAIRMAN, in presenting the Albert Gold Medal, which was awarded to Messrs. Cooke and Wheatstone, for the practical introduction of the electric telegraph, not only to this country, but to every country in the world, expressed his regret at the absence of Professor Wheatstone. It was a cause of just pride to this country that we should have been the first to introduce this discovery to the world, one fraught with such inestimable blessings to mankind. It was a special gratification to him to be the medium of presenting this medal to one with whom he had been long on terms of close personal friendship. He now begged to present to Mr. Fothergill Cooke the Albert Gold Medal of the Society.

"Mr. FOTHERGILL COOKE said he could not accept this award in silence. It was one of the highest honours that could be conferred upon any individual, associated as it was with the name and the memory of one who was for so many years President of this Society, and who was so much beloved for his personal goodness, and for the warm interest which he ever took in all that tended to the benefit of this country. Moreover, he felt not a little proud of having his name placed in the same roll of honour with those of Sir Rowland Hill and Professor Faraday. The Chairman had mentioned this evening that it was in this country the electric telegraph was first introduced. He hoped that would not be forgotten, for, besides being an individual source of gratification to himself, he

ALBERT GOLD MEDAL.

hoped the nation would one day feel proud of having set the example in this respect to the other countries of the world. He returned his grateful thanks for the high honour which had been conferred upon him."

It has already been stated, that the publication of these **LETTERS** was suspended on the first rumour of that intention of the Society of Arts, which has now been fulfilled. For it was confidently anticipated that Professor Wheatstone would avail himself of so favourable an opportunity of renouncing in his own name the unfounded claims which have of late overshadowed his private character by once more confirming the facts he accepted in the Award of Sir I. Brunel and Professor Daniell, as well as of removing from the minds of Mr. Fothergill Cooke's friends all other causes of complaint, a course which would have superseded the **LETTERS** altogether.

The amicable hope has been disappointed. Professor Wheatstone has made no sign, having declined the manly course, which would at once have done honour to himself and justice to his laborious Chief.

It may be urged—as the 4th Albert Gold Medal was awarded for the practical introduction of the first Electric Telegraph in 1837; and as Professor Wheatstone had subscribed the Brunel Award, which declared Mr. Fothergill Cooke entitled to stand alone as the man to whom this country is indebted for that great achievement—that, therefore, Professor Wheatstone could not accept a duplicate of the splendid Medal given by the Society, with the special approval of H.R.H. the Prince of Wales, its President, without again being open to the charge of depriving Mr. Fothergill Cooke of his acknowledged exclusive right.

If such were the Professor's feelings, he should either in person, by letter, or through a friend, have openly declared those sentiments on the 19th of November last. The special recognition of

ALBERT GOLD MEDAL.

his scientific co-operation was certainly designed in those words of the Chairman's address which particularized the "scientific knowledge" and "application of scientific principles" which had been exhibited.

Former experience now forces on Mr. Cooke's friends the conviction that Professor Wheatstone will again follow his old line of policy, as practised by him in 1842, in 1856, and in 1866; and, after a few years have elapsed in silence, will again appear, under the initial of some anonymous writer, as "the gentleman entitled to stand alone."

So far as practicable, this course must be prevented; and the immediate publication of the LETTERS, and the wide distribution of them among the scientific and literary men of all nations, accompanied by the extensive establishment of Mr. Cooke's two volumes in the public libraries of England, of the Continent, and of the United States, will, it is hoped, effectually prevent any future repetition of one of the greatest and most systematic acts of piratical usurpation and injustice ever attempted.

T. F. C.

4, JOHNSTONE STREET, BATH,
December 18th, 1867.

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POSTSCRIPT.

“FACTS ARE MORE CONVINCING THAN ARGUMENTS.”

‘Cooke's friends, justified by **FACTS**, demand withdrawal of Wheatstone's often-repeated “**INSINUATIONS**.” **ADVICE** and **WARNING** have been thrown away.
THE **FACTS** ARE IN THE FOREGOING PAGES .. . 127

The more prominent of those **FACTS** are brought to particular and decisive issue in **PLAIN QUESTIONS** addressed to Mr. Wheatstone. Mr. Wheatstone's **ANSWER** awaited. .. . 128

PIONEERS OF ELECTRIC TELEGRAPHY.

The following **LETTERS** are limited by their object and plan to an examination of the relative positions of Mr. W. Fothergill Cooke and Professor Wheatstone, in the introduction of the Practical Electric Telegraph. In conformity with this plan a few only of the many distinguished men who preceded them in their labours occur, even for casual and incidental notice. It is therefore wished, as a just tribute to acknowledged merit, to place, in chronological order before the reader, the names of such of these distinguished men as appear most directly to have prepared the way for the great practical realization which originated in England in the years 1836—7.

1665.—The earliest *record* of the idea that the magnetic needle might be the means of telegraphic communication bears the date of the year 1665; and appears to have been taken from a much older impression. (*See* pp. 75, 76.)

The first practical experiments proving water and damp soil to be conductors of electricity :—

1747.—Sir William Watson passed electricity through 9,000 feet of earth and water across the Thames, and through 10,000 feet of wire suspended upon poles at Shooter's Hill.

1748.—Franklin repeated like experiments across the Schuyl-kill, at Philadelphia.

1749.—Du Luc tried similar experiments across the Lake of Geneva.

Original plans of electric telegraphs by static electricity and pith-balls. Attention to the signals called by alarums :—

1753 —“C. M.,” in a letter to the “Scots Magazine,” described a good practical plan of telegraphing with the following details :—(1.) A separate wire used for each letter of the alphabet. (2.) Wires supported at every twenty yards on glass, or jeweller's cement, for insulation. (3.) Each signal given by a pith-ball electroscope, or by the motion of slips of paper on which the designated letter was written. (4.) The telegraph reciprocal in its action, the correspondents giving and receiving signals by the same wires. (5.) Also by sounds of bells differently toned—the first “acoustic telegraph,” called by “C. M.” “the Language of the Chimes.” The vibration of the bell was caused by the discharge of the electric spark. (6.) “C. M.” spoke of his cluster of wires as an “electrified cable.” (7.) Wires insulated from the atmosphere

by a "thin coating of jeweller's cement."—See a most interesting article on the *Electric Telegraph* by Sir David Brewster in the *North British Review*, vol. xxii., p. 548.

1774.—Lesage at Geneva.—(1.) Wires twenty-four in number, like those of "C. M.," each connected with an arrangement of pith-balls. (2.) Each signal given by a divergence of pith-balls opposite to the corresponding letter.—Lesage reduced his plan to practice.

1786.—Lomond combined the signals of the pith-balls, and so diminished the number of the wires.—He also reduced his plan to practice.

1794.—Betancourt worked a pith-ball telegraph thirty miles from Madrid to Aranjuez.

1816.—Mr. Ronalds worked his telegraph through eight miles of wire at Hammersmith. (1.) Pith-ball electroscopes were kept in repellent action under electric agency, the collapse of the balls giving the signal. (2.) Signals were also shown, through an aperture, on two revolving clock-work dials in correspondence with each other; the signal visible through the aperture, when the balls collapsed on the cessation of the current, being indicated. (3.) One wire only was required; the electricity being discharged into the earth. (4.) Attention was called by the explosion of gas, or gunpowder. This was the first and last successful application of static electricity to a telegraph. (See *Account of this telegraph published by Francis Ronalds*. 1823.)

Telegraphs showing signals by sparks from frictional electricity :—

1794.—Reusser proposed to make the electric spark illuminate a letter formed of separate pieces of tinfoil placed in the course of the discharge; using a separate wire for each letter. Thus for the letter N :—



1794.—Don Silva in Spain described an electric telegraph by sparks, for which he only used one wire.

1795.—Cavallo published, in his "Traité d'Electricité," his plan of telegraphing by electric sparks at regulated distances, representing the idea of Morse's telegraph. Thus : — — — — —.

Electric Alarums :—

1794.—Reusser employed a small cannon, which he fired by electric sparks.

1795.—Cavallo published his plan of exploding hydro-oxygen gas, or gunpowder, by electric sparks.

1816.—Ronalds proposed using explosive gas.

Telegraphs, &c., by Galvanic Electricity :—

1800.—About this date Nicholson and Sir A. Carlisle discovered that the Voltaic current decomposed water, and disengaged hydrogen gas.

1802.—ROMAGNOSI discovered that the Magnetic needle was deflected by a galvanic current ;

1805.—And published the discovery.

1809.—SCÈMMERING invented his electric telegraph at Munich, giving his signals by the evolution of gas ;

1810.—And showed it to Baron Schelling, and to many other persons.

1812.—SCHELLING carried his “subaqueous galvanic conducting cord,” (coated with a solution of India rubber and varnish,) through the river Neva at St. Petersburg.

1820.—ØRSTED (perhaps discovered independently, and) again published Romagnosi's discovery.—And AMPÈRE suggested that the deflection of the needle might be used for telegraphic purposes, and proposed to substitute the needle for Scœmmering's decomposing apparatus.

1824.—SCWEIGGER invented the *multiplier coil* around the magnetic needle—the basis of the needle telegraph—rendering Ampère's suggestion practicable. The Magnetic Needle Telegraph might have been a practical reality from this date.

1825.—STURGEON discovered the principle of the Voltaic magnet.

1830.—BARON SCHELLING invented his telegraph with five needles, and an alarum.—The most perfect plan of a telegraph down to that date.

1831.—MICHAEL FARADAY discovered Galvano-Electric Induction, and Magnetic Electricity ; and laid the foundation of—

1833.—GAUSS and WEBER's Telegraph, made at Göttingen, with Scweigger's multiplier moved by magneto-electricity instead of the Voltaic current—a great advantage.—Gauss and Weber employed this telegraph for regulating clocks, and for other scientific purposes.

1833.—STEINHEIL now entered the field, and undertook the practical working out of the telegraphic ideas of Gauss and Weber with high scientific skill and great success.

1835.—Schelling exhibited his telegraph, simplified to a single needle, at Bonn.

1835.—Professor WHEATSTONE showed the same at his lectures at King's College.

1836.—MUNCKE, having in the previous year made a model of Schelling's Single Needle Telegraph for his lectures at Heidelberg, showed the same to W. Fothergill Cooke about the 6th of March.

1836.—COOKE completed his original pair of working three needle telegraphs with keys and reciprocal system immediately ; invented his Mechanical Telegraphic Alarum, and his Detector, and returned to England ; drew up a “Sketch” of his system during the summer, and made five Clock-work Telegraphs with various Alarums during the winter ; negotiated with the Liverpool and Manchester Railway Company for the use thereof ;

1837. . Became acquainted with Wheatstone in February, 1837 ; and took out a patent with him in June of the same year.

LIBRARIES,
WHERE THE TWO VOLUMES OF REFERENCE
ON
THE ELECTRIC TELEGRAPH,
BY
WILLIAM FOTHERGILL COOKE,
MAY BE CONSULTED.

In Great Britain and Ireland.

Army and Navy Club.
Athenæum.
Anthropological Society.
Bath Club, in Queen's Square, Bath.
British Museum.
Conservative Club.
Dublin University Library.
Geographical Society.
Institution of Civil Engineers.
Junior United Service Club.
Oriental Club.
Philosophical Institution, Edinburgh.
Royal Artillery Institution, Woolwich.
Royal United Service Institution.
Reform Club.
Royal Yacht Club, Ryde.
Senior United Service Club.
Society of Arts.

Temple Library, London.
University Library, Cambridge.
University Library, Oxford.
The Libraries of the House of Lords
and House of Commons.

On the Continent.

Galignani's Library, Paris.
Imperial Library, Paris.
Royal Library, Berlin.
Royal Library, Brussels.
Royal Library, Dresden.
Town Library, Pau.
University Library, Bonn.
University Library, Breslau.
University Library, Erlangen.
University Library, Göttingen.
University Library, Halle.
University Library, Heidelberg.
University Library, Leipzig.
University Library, Vienna.
Veissaux's Library, Florence.

In the United States.

All the principal public libraries, more than forty in number.

To each of the libraries in the foregoing list a copy of the fourth edition of Mr. Fothergill Cooke's pamphlet of 1854 has been sent; and to each of them a copy of these LETTERS will be sent as soon as they have been published.

A W A R D
OF
SIR MARC ISAMBARD BRUNEL
AND
PROFESSOR DANIELL.

“As the Electric Telegraph has recently attracted a considerable share of public attention, our friends, Messrs. Cooke and Wheatstone, have been put to some inconvenience, by a misunderstanding which has prevailed respecting their relative positions in connexion with the invention. The following short statement of the facts has, therefore, at their request, been drawn up by us the undersigned Sir M. Isambard Brunel, Engineer of the Thames Tunnel, and Professor Daniell, of King's College, as a document which either party may at pleasure make publicly known.

“In March, 1836, Mr. Cooke, while engaged at Heidelberg in scientific pursuits, witnessed, for the first time, one of those well-known experiments on electricity, considered as a possible means of communicating intelligence, which have been tried and exhibited from time to time, during many years, by various philosophers. Struck with the vast importance of an instantaneous mode of communication, to the railways then extending themselves over Great Britain, as well as to government and general purposes, and impressed with a strong conviction that so great an object might be practically attained by means of electricity, Mr. Cooke immediately directed his attention to the adaptation of electricity to a practical system of Telegraphing; and, giving up the profession in which he was engaged, he,

from that hour, devoted himself exclusively to the realization of that object. He came to England in April, 1836, to perfect his plans and instruments. In February, 1837, while engaged in completing a set of instruments for an intended experimental application of his Telegraph to a tunnel on the Liverpool and Manchester Railway, he became acquainted, through the introduction of Dr. Roget, with Professor Wheatstone, who had for several years given much attention to the subject of transmitting intelligence by electricity, and had made several discoveries of the highest importance connected with this subject. Among these were his well-known determination of the velocity of electricity, when passing through a metal wire; his experiments, in which the deflection of magnetic needles, the decomposition of water, and other voltaic and magneto-electric effects, were produced through greater lengths of wire than had ever before been experimented upon; and his original method of converting a few wires into a considerable number of circuits, so that they might transmit the greatest number of signals, which can be transmitted by a given number of wires, by the deflection of magnetic needles.

"In May, 1837, Messrs. Cooke and Wheatstone took out a joint English patent, on a footing of equality, for their existing inventions. The terms of their partnership, which were more exactly defined and confirmed in November, 1837, by a partnership deed, vested in Mr. Cooke, as the originator of the undertaking, the exclusive management of the invention, in Great Britain, Ireland, and the Colonies, with the exclusive engineering department, as between themselves, and all the benefits arising from the laying down of the lines, and the manufacture of the instruments. As partners standing on a perfect equality, Messrs. Cooke and Wheatstone were to divide equally all proceeds arising from the granting of licenses, or from sale of the patent rights; a per-centage being first payable to Mr. Cooke, as manager. Professor Wheatstone retained an equal voice with Mr. Cooke in selecting and modifying the forms of the telegraphic instruments, and both parties pledged themselves to impart to each other, for their equal and mutual benefit, all improvements, of whatever kind, which they might become possessed of, connected with the giving of signals, or the sounding of alarms, by means of electricity. Since the formation of the partnership, the undertaking has rapidly progressed, under the constant and equally successful exertions of the parties in their distinct depart-

ments, until it has attained the character of a simple and practical system, worked out scientifically on the sure basis of actual experience.

"While Mr. Cooke is entitled to stand alone, as the gentleman to whom this country is indebted for having practically introduced and carried out the Electric Telegraph as a useful undertaking, promising to be a work of national importance ; and Professor Wheatstone is acknowledged as the scientific man, whose profound and successful researches had already prepared the public to receive it as a project capable of practical application ; it is to the united labours of two gentlemen so well qualified for mutual assistance, that we must attribute the rapid progress which this important invention has made during the five years since they have been associated.

M^C I^D BRUNEL.

J. F. DANIELL.

London, 27th April, 1841."

" LONDON, 27th April, 1841.

GENTLEMEN,

We cordially acknowledge the correctness of the facts stated in the above document, and beg to express our grateful sense of the very friendly and gratifying manner in which you have recorded your opinion of our joint labours, and of the value of our invention.

We are, GENTLEMEN,

With feelings of the highest esteem,

Your obedient Servants,

WILLM. F. COOKE,

C. WHEATSTONE.

SIR M. ISAMBARD BRUNEL, and

J. F. DANIELL, Esq., Professor, &c., &c."

"SIR CHARLES WHEATSTONE."

THE TIMES, on the 11th inst., makes the following quotation :—

PROFESSOR WHEATSTONE.—It is understood to be the intention of Government to confer a title on Professor Wheatstone, in consideration of his scientific attainments, and of his valuable inventions."—*Pall Mall*

THE STANDARD, on the 13th, thus announces the fulfilment :—

SIR CHARLES WHEATSTONE.—The public will learn with satisfaction that the honour of knighthood has at length been conferred on Sir Charles Wheatstone, as a reward for years of anxious devotion to a discovery which has done more to assist the progress of civilisation and peace throughout the world than any other invention within the memory of man."

It will not escape observation that explicit mention of the ELECTRIC TELEGRAPH is avoided by both these journals. This reserve is evidently due to the powerfully substantiated advocacy of my brother's rights by the public press from Oct. 26, 1866, to Feb. 15, 1867, (see EXTRACTS from the Daily Press, &c. pp. 58—95, *infra*;)—to the emphatic and reiterated challenge of reply, by which that advocacy was accompanied, (see pp. 66, 67, and 90;)—and to the significant fact that NO REPLY TO THAT LONG-CONTINUED ADVOCACY HAS EVER BEEN EVEN ATTEMPTED, (see p. 95.)

The coincidence of reserve, in this same particular, in both these powerful journals is remarkable in itself.—The reserve of THE STANDARD, in its very cautiously-worded notice, is also remarkable in this, that its description of the only ground on which the honour had been conferred must be understood as referring to that particular invention which it abstains from naming. The reserve of THE TIMES is remarkable in another respect, viz., that its quoted notice grounds its title primarily on Professor Wheatstone's "great scientific attainments," (which have never been questioned,) and secondarily on "his valuable inventions," in general, (which, I believe, are many and meritorious,) with no reference to the Telegraph whatever. This reserve on the part of THE TIMES is not only remarkable, it is emphatic; as that great journal has always strenuously advocated Professor Wheatstone's claims to the recognition of the Electric Telegraph as unique; and on the 11th of October, 1866, with voice loud and clear, it issued a peremptory demand for national honours for him from Government on that ground.

Sir Charles Wheatstone may claim the high honour of having, perhaps, perfected the Electric Telegraph by his very meritorious "Automatic" instrument invented in 1867. It is highly praised in Mr. Timbs' recent work on Great Inventions, and had previously been described in the Illustrated News as exhibited at Paris. It is proper to state, however, that this Instrument, as well as all other Mechanical Telegraphs, depends on the principle originally invented by my brother in 1836. (See Mr. Varley's testimony, p. 35, *infra*.) With respect to this instrument I make the following quotation from a letter now before me:—

"December 26th, 1867.

"Wheatstone's Automatic Telegraph deserves all that Mr. Timbs says of it. The Telegraph Company is now using it, and speaks most highly of its performance. It is a great improvement on the old Mechanical Telegraph, and works with Bain's type, which is cut by an improvement on Sievier's stamper."

When I say that the foregoing extract is taken from a private letter, written by my brother in reply to my enquiry Whether he knew anything of the Automatic Telegraph, and to my remark, That Mr. Timbs had spoken of it as "*of pre-eminent excellence*," it will be seen that the frank and cordial testimony which my brother has uniformly borne to every well-grounded claim of Professor Wheatstone still remains unimpaired by years of injury and injustice.

When the Public at large and the responsible representatives of the general Press shall have been disabused—as one day they will be disabused—of the deceptive influence of that too large portion of the scientific Press, which has been anonymously prompted, nothing will be more clearly established, than that the controversy between my brother and Sir C. Wheatstone respecting the Origination and Introduction of the Practical Electric Telegraph has been forced upon the former by the inexcusable unreasonableness of the latter; and that in that controversy "the surest vantage ground of the latter has ever been found in the traces, abundant from the beginning, of the liberality—of the generosity—and of the forbearance of the former." P. 53.

Into that controversy the Automatic Telegraph does not enter.

T. FOTHERGILL COOKE.

4, Johnstone Street, Bath.

Jan. 20th, 1868.

LETTER I.

THE ELECTRIC TELEGRAPH.—INTRODUCTORY.

*To the Editor of The * * * * **

SIR,

I will not occupy your space with prefatory observations, but proceed at once with the substance of this introductory letter.

In the matter of the Electric Telegraph Arbitration between William Fothergill Cooke and Charles Wheatstone, the judicial Award of Sir I. Brunel and Professor Daniell, dated April 27th, 1841, pronounced—

“MR. COOKE THE ORIGINATOR OF THE UNDERTAKING,—AND ENTITLED TO STAND ALONE, AS THE GENTLEMAN TO WHOM THIS COUNTRY IS INDEBTED, FOR HAVING PRACTICALLY INTRODUCED AND CARRIED OUT THE ELECTRIC TELEGRAPH.”

As *part of the Award*—to give full weight to the judgment of the Arbitrators by a final acquiescence—Messrs. Cooke and Wheatstone, as plaintiff and defendant, were required to sign a formal letter to the Arbitrators, in these words:—“We cordially acknowledge the correctness of the facts stated in the” Award, &c., followed by expressions of gratitude.

On the 6th of November last, in a letter written to Professor Wheatstone, expressly for publication, my brother sternly questions the Professor on this subject.

“I will close my letter in the language of a concluding passage of my Reply to your pamphlet of 1856:—‘The Award cannot be both true and false. If it is true, Why have you not acted in accordance with it? If it is false, Why did you put your name to a cordial and grateful acknowledgment of the correctness of the facts stated in it? There is no escape from this dilemma.’” APPENDIX, Extract xi., p. 66.

A recent letter from Mr. Cromwell F. Varley, which has gone the round of the press, adopted by leading articles in daily journals, often quoted, never contradicted, ends with these emphatic words :—

“ Many philosophers have invented electric telegraphs ; many had foreseen their great use ; but the one man of indomitable energy, perseverance, and foresight, who took the matter up, and forced the public into its recognition, is undoubtedly William Fothergill Cooke.” APPENDIX, p. 71.

A correspondent of the Reader writes, on the 27th October, 1866 :—

“ ‘The Times,’ in its leading articles (of the 10th and 17th inst.,) has been claiming public honours for Professor Wheatstone, as the sole inventor of the Electric Telegraph ; but the advertising column (adjoining) of the same powerful journal contains an ‘Award,’ made in 1841, by Sir I. Brunel and Professor Daniell, which denies to the Professor either the sole or the leading authorship of the invention. Which are we to believe ?” APPENDIX, Extract vi., p. 59.

Another correspondent takes up the question on the 3rd of November :—

“ Which are we to believe ? The editorial column,—anonymous, unsupported by authority or evidence,—or the ‘Award,’—a judgment of two eminent men, who give the grounds on which they formed their decision, after having before them printed Evidence, Models, and the Litigants themselves,—Litigants, both of whom cordially acknowledged the correctness of the judgment, and their sense of gratitude to the judges ?” APPENDIX, p. 60.

In 1841 my brother appealed to the “Brunel” arbitration, and gained the “Award.”—In June, 1854, in an article in the *Quarterly Review*, known to be “prompted exclusively by Wheatstone,” that gentleman usurped as exclusively his own the honours awarded by the arbitration to my brother. This attack upon my brother’s rights called forth from him those pamphlets of 1854 and 1856, which silenced Professor Wheatstone and his friends for a time—for ten years. But in October last, in THE TIMES, the Professor usurped those rights once more, clothing himself in all the glory of the achieved Telegraph ; whilst THE TIMES lamented the neglect of an ungrateful public, which omitted to “give due honour to the man, who had brought the whole world within an instant of time.” *

Forced thus a third time from his retirement to a position of defence, my brother immediately addressed letters to the leading members of the Government, with copies

* It would be idle to pretend ignorance of the well-known partial channel through which these articles found access to the columns of The Times.

of the Award enclosed, requesting that he might be heard in his own behalf before any steps should be taken on the misrepresentations of the Press, or of Mr. Wheatstone's friends. To these letters he received immediate replies. The Award was also sent round to the papers the same day, for advertisement. By these steps he possibly preserved Mr. Wheatstone from being disgraced by accepting national honours, which his conscience would have repudiated, as not his due. His warning letter to the Professor, (APPENDIX, p. 63,) speedily followed. The re-publication of my brother's pamphlet of 1854 had become necessary, and he repeated his appeal to public justice in his former words. In the subjoined extract the conscious truthfulness and rectitude of that appeal will scarcely be overlooked.

"I venture to say, that no candid person can read my 'Case' without believing it, nor Mr. Wheatstone's 'Case,' with my solicitor's summary of the evidence in answer to it, without full conviction that every material part of his 'Case' is incorrect, and that the answer is beyond the reach of a reply."

Roused by these repeated attacks, made in defiance of justice and truth, my brother's friends have rallied round him, and resolved henceforth to charge themselves with the defence of his invaded rights. They are persuaded that it is requisite to exhibit to the Public that Evidence, which decided the Arbitrators; and as this can be effectively done in a few letters under distinct heads, I have been deputed thus to present to your readers an embodiment of the most important Evidence in contrasted extracts from the printed documents,—viz., from the Cases of the parties laid before the Arbitrators, from the summary of evidence also laid before them, and from the three pamphlets of 1854 and 1856. The references are to my brother's work on the Electric Telegraph, in two volumes, in which the whole of these documents is comprised.*

These extracts are frequently condensed, or re-arranged; but special care has been taken to preserve the sense unaltered. Brevity required this. References being always given to the original, substantial accuracy can be tested by comparison.

What now is known imperfectly by the Few will thus be imparted fully to the Many.

The very conviction of those Few,—mainly produced by my brother's re-printed Pamphlet of 1854,—indisposes them to seek for evidence. But the statements of the Pamphlet alone, unillustrated by the Evidence it refers to, cannot do justice to the controversy—cannot stir those operative feelings, without which long-established

* THE ELECTRIC TELEGRAPH; Was it Invented by Professor Wheatstone? By WILLIAM FOTHERGILL COOKE. Vol. i., Pamphlets of 1854—6; Vol. ii., Arbitration Papers. W. H. Smith & Son, Strand.

wrong goes undressed—cannot eradicate the prejudiced delusion, which has so taken possession of the public, that the most powerful and enlightened organs of the press can proclaim throughout the world with trumpet tongue, *another name alone, another name instead*—proclaim it with such secureness of foregone conclusion, that each modest testimony to truth was, till lately, treated as imposture, and denied a hearing.

The Evidence has lost nothing of the power by which its past signal triumphs were achieved. It drove Professor Wheatstone from *the whole debated ground*, when he accepted the Award in 1841;—accompanied by my brother's "Reply," it "silenced his guns, if it did not make him strike his colours," when the article in the "Quarterly," in 1854, had renewed the controversy;—and it now lies open to every eye in the re-printed arbitration papers,—a Phoenix, risen from the ashes of those flames, in which the mass of the first impression *was burnt*, in 1841, "*to prevent publicity*." Pamphlet, p. 17, 4th edition. See PREFACE, p. viii., note.

I venture to predict that, when it is presented to your readers in this condensed form, the judgment, which it wrought in the minds of the Arbitrators, will be reproduced in their own.

"Mr. Cooke," it has been said, "ensconced in the wilds of North Wales, may take this question quietly, but his friends are resolved to bring it to an issue"—a *final* issue, which may leave him in the quiet possession of his well-earned honors at the close of his life. Henceforth they take up his quarrel as their own. Their "urgent representations were needed," upon the last outburst in the *Times*, to rouse him to self-defence, before he could be prevailed upon to move in his own cause; and it will readily be believed with what burning indignation his relatives have seen him supplanted in his rights, well knowing the means by which that result has been effected.

This controversy has been periodically renewed by Professor Wheatstone and his advocates, since its original outbreak in 1841. In presenting the Facts, supported by the Evidence, before the Public, we confidently appeal to their honest judgment as to a final issue, with the firm conviction that the Verdict will relieve my brother from future spoliation of his Rights; and that he will not, after his manful and prolonged struggle for the attainment of his great success, be condemned to a never-ending strife for the maintenance of his awarded Title,—"*To stand alone as the Originator and Introducer of the Practical Electric Telegraph*."

I am, Sir, your obedient Servant,

The Chesnuts, Guildford, Surrey.
January 14th, 1867.

THOMAS FOTHERGILL COOKE.

LETTER II.

"PRIORITY" AND "PRACTICAL ADVANCES."

SIR,

I commence at once with my promised "Extracts."

In 1841, Professor Wheatstone opens his Case before the Arbitrators by stating, that he "had made important practical advances long before he had any acquaintance with, or had ever heard of," my brother; vol. ii. p. 86; and that "his experiments had also, (before that acquaintance,) been announced in print, in the Magazine of Popular Science, for March, 1837," (*ibid.*)

In 1854 he opens an article in the Quarterly Review for June—an article suspected at the time, for reasons assigned at page 134, vol. i., and since discovered, to have been "exclusively prompted by Wheatstone"—with a repetition of the "announcement in the Magazine."

Again, in 1856, after confirming the *reverse as the fact* by signing the Award, he reasserts in similar terms, that "he had made important practical advances, which were already mentioned in print, before Mr. Cooke's introductory visit;" and verifies that assertion by a quotation from the Magazine of Popular Science, in which it is affirmed, that "Mr. Wheatstone's apparatus, *as it is at present constructed*, is capable of conveying thirty simple signals." Vol. i., p. 52.

Thus to the evidence of the Magazine he triumphantly points,—1st, before the Arbitrators, in 1841; 2ndly, in the Quarterly Review, in 1854; 3rdly, in his Answer of 1856; as "the publication of his important practical advances," previous to my brother's introductory visit. From the prominence thus given to this statement by Professor Wheatstone, and from his frequent repetition of it, it is evident that he designs to represent it as an essential and unassailable part of his case.

Let us see how this Champion statement bears the brunt of battle

- (1.) As regards *the priority* of the publication.
- (2.) As regards *the existence* of the advances.

(1.) As regards *the priority* of the publication.

My brother proved to the Arbitrators by the post-mark of a letter, posted *on the 27th of Feb.*, 1837, that the introductory visit occurred *on that day*. This letter, which was without envelope, described my brother's first interview and conversation with the Professor on the day it took place. Vol. ii., p. 143. The Arbitrators recorded their acceptance of the proof by *the insertion of the date of the visit in the Award!*

My brother found that the publication in question—

“Contained a notice of a lecture delivered by Professor Wheatstone in the preceding June, i.e., *more than eight months before*; and that the notice was in the form of an editor's note in brackets, crowded into the space at the end of an article at the lower part of a page; that in four volumes of the Magazine numerous similar spaces occurred at the end of articles, which were invariably left blank; and that nowhere else in all the four volumes was there any similar insertion.” Reply of '56; vol. i. p. 153.

With these facts before him my brother did not hesitate ten years ago to speak out his suspicions in these words:

“There is something so exceedingly suspicious, both about the form, and about the matter, of this ‘announcement in public print,’ which he puts forward on all occasions as his champion, that I am half inclined to suspect Professor Wheatstone got the Editor's note squeezed into the Magazine at the last moment, in consequence of my having called upon him on the 27th of Feb.—At all events, it cannot reasonably be doubted, that he had, directly or indirectly, some hand in the preparation of the Editor's note; and I must leave it to him to account for the remarkable circumstance of his suddenly announcing himself in print, at a critical moment, after a nine-months' silence,” (*ibid.*)

The ‘remarkable circumstance’ has never been accounted for. My brother also remarks, that “the March number of the Magazine contains other matter,” (notice of patents, I believe,) “which could not have been obtained earlier than the 26th of Feb.,” (*ibid.*) So that the “Editor's note” would be in good time on the 27th. In any case,—the “introductory visit” having been proved by my brother, and admitted by Professor Wheatstone himself, to have taken place on the 27th of Feb., and the publication having occurred some day in the first week of March, the *priority* of the publication fell to the ground in the Arbitration; and in honour, or in common honesty, should never have been repeated.

(2.) As regards *the existence* of the advances.

“The Editor's note,” so often and triumphantly appealed to by Professor Wheat-

stone, and, therefore, abundantly stamped with his authority, affirms that his "apparatus, as it is at present constructed," (he has himself italicised these words in his "Answer" of '56, vol. i., p. 52,) "is capable of conveying thirty simple signals." My brother proved to the Arbitrators, (and Professor Daniell knew the fact,) that Professor Wheatstone's "apparatus" included nothing whatever, beyond two ordinary electrical galvanometers, and his "key-board;" as these are published in the Arbitration Drawings, vol. ii., and at vol. i., p. 155, and in the recently reprinted pamphlet, p. 33.

Mark well the result.—Instead of the Award recording Mr. Wheatstone's "apparatus, as at present constructed, capable of conveying thirty simple signals," as claimed by the often-quoted Editor's note; it simply records "Mr. Wheatstone's method of converting a few wires into a considerable number of circuits," and silently disallows the existence of the "apparatus;" whilst it *twice* records, in a marked manner, my brother's "instruments;" which instruments were all delineated in the Arbitration Drawings, and the instruments themselves lodged at King's College for inspection and identification by the Arbitrators, and Witnesses.

Let us pass on to *another "practical advance."* Mr. Wheatstone says, in his Answer of '56,—

"A Submarine Electric Telegraph was from the commencement of my experiments, a prominent object of my thoughts. I have several letters, (not produced) dated in the spring of 1837, from gentlemen acquainted with my plans, referring to my project." Vol. i., p. 129. In his Case laid before the Arbitrators he says, (vol. ii., pp. 85 and 86,) "Some time before Mr. Cooke introduced himself to me, I had made arrangements for trying an experiment across the Thames, from my lecture-room to the opposite shore. Mr. Enderby kindly undertook to prepare the insulating rope containing the wires, and to obtain permission from Mr. Walker to carry the other termination to his shot-tower. After many experiments had been made with the rope, and the permission granted, I relinquished the experiment; because after my connexion with Mr. Cooke, it was necessary to divert the funds I had destined for this purpose to other uses. My experiments, (but *not with the 'Enderby-rope,'* as this passage seems intended to suggest,) had also been announced in the Magazine, &c., &c."

But the Magazine is now out of court. This alleged practical advance is thus disposed of in the "Address laid before the Arbitrators by Mr. Wilson (my brother's solicitor,) on Feb. 27, '41;" vol. ii., p. 115. Mr. Wilson there says to those gentlemen,

"When Mr. Wheatstone alleges that he *had made arrangements* for trying the experiment: and that, *after many experiments had been made with the rope*, he relinquished the experiment, *because after his connexion with*

Mr. Cooke, it was necessary to divert to other uses the funds, which he had destined for it; his statements are absolutely contrary to the facts. The following is an extant letter, written by Mr. Enderby, not to Wheatstone, but to Cooke, in the course of Cooke's superintendence of the preparation of the same identical "insulating rope," the only one made, which Wheatstone says he alone had had prepared; and on which he had tried so "many experiments," "long before he had any acquaintance with, or had ever heard of, Mr. Cooke," as to entitle the rope to a place in the two "important practical advances" recorded in a deliberate written Case, as the main grounds of his claim to the invention of the Practical Electric Telegraph. It will be observed, that the letter was written nearly four months after the parties had become acquainted, and only two days before the date of the patent.

GREENWICH ROPEERY, 10th June, 1837.

"SIR,—We (are) covering the wire with hemp; but, *previous to forming it into the rope*, we shall be glad to submit it to your inspection, &c.

We are, &c.,

(Signed)

ENDERBY, BROTHERS.'

— COOKE, Esq.

"The measurements across the Thames were made by Mr. Cooke and a private friend, and the rope was made by Messrs. Enderby, as the above letter shows, and as other documentary evidence will confirm, under Cooke's directions. It was first tried on the London and Birmingham Railway; while there, *an accidental shower of rain wetted it, and destroyed the insulation, and thus made it evident, that the insulation would not continue under water*: this prevented an absurd failure in the much talked of cross-Thames experiment. Observe, also, Wheatstone has attributed the abandonment of the experiment to his finding it necessary to divert to other uses the funds destined by him for this; yet *he never destined any funds to the purpose; Cooke advanced the funds, and inserted his payments as items in his general accounts*. In Dec., 1837, Messrs. Glascott, who supplied the wire for the rope, wrote to Wheatstone that Messrs. Enderby had referred them to him for payment. Wheatstone forwarded to Cooke their letter, with one from himself, requesting Cooke 'to have the kindness to see to it,' and observing that 'it related to a transaction of which he himself knew nothing.'"^{*} Vol. ii., pp. 181—183. See APPENDIX C, p. 112.

Mr. Wheatstone claimed credit in his Case before the Arbitrators for one other "practical advance."

"Some time before Mr. Cooke introduced himself to me, I considered my experiments sufficiently matured to enable me to undertake some important

^{*} The letters, and other documents, of the arbitration have all been preserved by my brother's solicitor, Mr. Willson.

practical result. I informed Mr. Fox, an engineer of the London and Birmingham Railway, of my expectations, and told him of my willingness to superintend the establishment of an Electric Telegraph on that railway." Vol. ii., p. 85.

Mr. Wilson, in his Address, points out to the Arbitrators the inconsistency of this statement with a passage of Mr. Wheatstone's letter of October 26th, 1840, (vol. i., pp. 115 and 116,) which led to the arbitration; and also with a passage in his Case laid before the Arbitrators, (vol. ii., pp. 89 and 90,) in which two passages Mr. Wheatstone states, that—

"Feeling himself perfectly confident of being able to carry out his views to the ends he anticipated, and fully intending to do so," his purpose was (so definitely limited to) "*publishing the results, and then allowing any person to carry them into practical effect*," that he was "strongly opposed to a partnership, when first proposed" (by my brother;)—that "neither his occupations, nor his inclination, qualified him for the part Mr. Cooke promised to perform," (viz., that part of superintending the establishment of telegraphs on railway-lines, which he nevertheless declared, that he had recently proposed to Mr. Fox to undertake;)—and that "by associating himself with any other person, he should diminish the credit to be obtained by publishing, and put that person in a position to claim the merit of what he had done." Vol. ii., p. 127.

Mr. Wilson also pointed out to the Arbitrators the improbability that "proposals for such an important undertaking should have been made to Mr. Fox," (afterwards Sir C. Fox, but) "at the time, only a sub-assistant engineer." (*Ibid.* p. 128.) Mr. Wilson also informed them, that my brother, (who was altogether sceptical about the "proposal")—

"Paid a visit to Mr. Fox, near Birmingham, and showed him Wheatstone's statement; but that Fox had no recollection upon the subject, and could find no trace of it among his papers" (*ibid.*)—also, that very soon after these (alleged) offers to Fox, my brother, "having obtained introduction to the chairman, secretary, and Mr. R. Stephenson, the engineer, as soon as the Directors heard of the Electric Telegraph, they entered upon a trial of it with the utmost expedition and ardour, *not as the continuance of any old proposals, but as an entirely new thing*" (*ibid.*, p. 129).

A private letter from my brother to our mother, dated July 2, 1837 (printed at length, vol. ii., p. 130), gives a graphic account of the facts, at the time they happened; four years before Mr. Wheatstone drew upon memory for his version of them.

I should not be doing justice to the foregoing, if I omitted to point out, that these four blots—the blot of *the prior publication*—the blot of *the apparatus*, as

constructed, giving 30 signals—the blot of the Enderby rope—and the blot of the proposal to Sir C. Fox—any one of which by itself would seriously discredit an entire work, are not found scattered over Mr. Wheatstone's Case, but follow each other consecutively within the length of a single page (vol. ii., p. 85 latter half, and p. 86 former half); and that, virtually the first page of the Case, which he laid with a grave countenance before the Arbitrators. And that virtually first page of his Case is but a fair sample of "every material part of the whole."

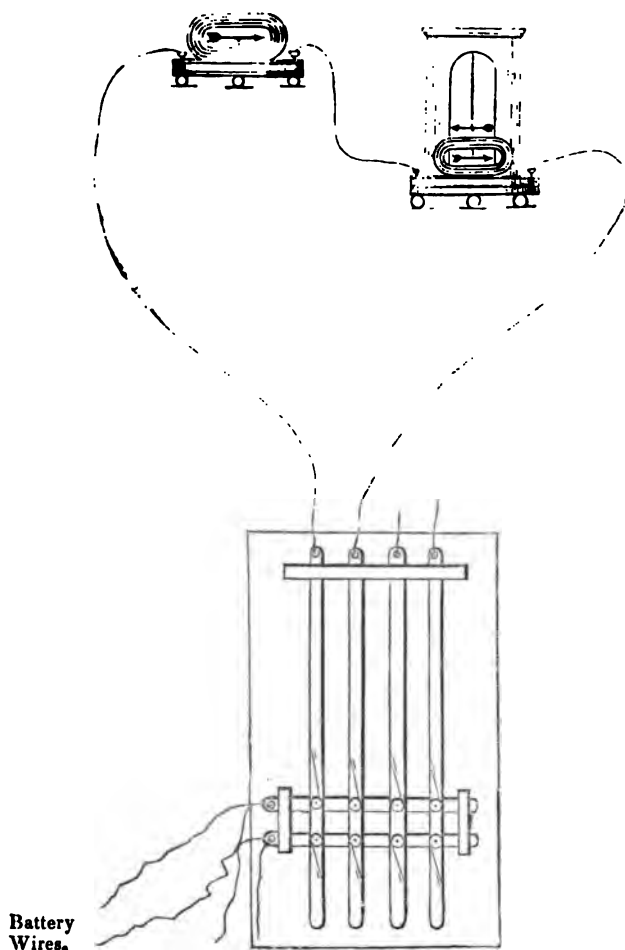
Accordingly, Mr. Wilson in passing from this part of the subject addresses the Arbitrators in these words:—

"I may now appeal to you, Gentlemen, whether I exceeded the truth in telling you, that Professor Wheatstone's statements in support of his alleged 'practical advances' are inconsistent with his other statements, and contrary to the facts, and also, that whatever truth there is in them can be traced to trifling circumstances of no practical consequence. And here I leave this subject, with a further observation;—that this is only one out of a number of instances, in which you will find the most extensive claims, and even the most serious charges, built upon the narrowest basis of truth. I am sorry to add, that the 'Thames experiment,' especially, presents a striking instance of another too numerous class of statements, in which Professor Wheatstone has boldly and positively, and sometimes most circumstantially, advanced upon memory assertions, of which he could not possibly feel certain, and which the weight of his name might have induced the Arbitrators to receive, contrary to the truth, if Mr. Cooke were not happily able to disprove them by conclusive documentary evidence, of the existence of which Professor Wheatstone had not the remotest idea." Vol. ii., p. 134.

Mr. Wheatstone, in anticipation of the reprint of the volume here quoted, took occasion in 1856 to call it an "*ex parte* volume."

"Mr. Cooke (he said) proposes to reprint his ex parte volume, containing some collateral imputations on Mr. Wheatstone, founded on HIS OWN CONFUSION of DATES and TRANSACTIONS, and which Mr. Wheatstone may, OR MAY NOT, think it worth his while to notice." ANSWER of '56, Vol. i., p. 88.

When the dreaded volume appeared, it was found not to be *ex parte*; for it contained Mr. Wheatstone's CASE for the Arbitrators in 1841: whilst an accompanying volume contained also his ANSWER of 1856 to my brother's Pamphlet of 1854.—If, as further containing, in Mr. Wilson's Address, a summary of the evidence on my brother's part without any counter-evidence on the part of Mr. Wheatstone, the former volume appeared to be *ex parte*, the explanation is simple. *No counter-evidence was produced!*—"Mr. Wilson fully explained to Mr. Daniell that the ulterior proceedings should be added." Vol. i., p. 208. But *there was nothing to*



Plan of Professor Wheatstone's Permutating Key-board, being his only telegraphic instrument at the commencement of the partnership, in May, 1837: shown in connexion with a Melloni's galvanometer, and a common coil, used in his experiments. His visitors at King's College in 1836 and 1837 will recognize the accuracy of this sketch. Vol. I. p. 155.

add! Mr. Wheatstone had two months to answer my brother's Case before the volume was printed for the use of the Arbitrators, and one month afterwards. But —*neither answer, nor counter-evidence, was produced by him!* He allowed all my brother's statements to pass unchallenged, and to be recorded in the Arbitrators' Verdict.

As Mr. Wheatstone, therefore, did "*not* think it worth his while to notice" the contents of this volume, either when placed before the Arbitrators in 1841, or when reprinted in 1856, the reader must judge whether the "*confusion of dates and transactions*" lay with Mr. Cooke, or with Mr. Wheatstone. The opinion of the Arbitrators is unmistakable.

In Professor Wheatstone's letter of October 26, 1840, already quoted, he thus addresses my brother, *before the arbitration* :—

"You forget that all you have put forward at the conclusion of your letter, as the 'broad basis of your claim,' is equally applicable to me. Your words are, 'that alone, unaided, and unadvised, you projected, and after five years of indefatigable perseverance, amid the greatest difficulties, have now introduced into daily use, your own project of a practical Electric Telegraph, which in theory had remained for many years a plaything in the hands of scientific men, and might, but for your exclusive devotion to it, from the first day the idea occurred to you, have remained so to this day:' you forget that I, (Professor Wheatstone,) alone, unaided, *before I was acquainted with you,*" &c., &c. (in one word, did all the same). Vol. i., p. 123.

Confronting this clear statement of the exactly balanced, but antagonistic, claims of the parties, I give a brief summary of the Award, with a few established dates, as commentary. Professor Wheatstone commences his experiments, bearing on telegraphy, in 1823 ;—lectures on them down to June, 1836 ;—and gets a report of his June lectures, of 1836, printed in March, 1837, a few days *after* he had become acquainted with my brother on the 27th of February. That printed report contains nothing to the purpose, except the imaginary "30 signal apparatus, already constructed," and we have seen how that has been disposed of. Down to this time, therefore, the existence of his "key-board" only, (*i.e.*, "his original method of converting a few wires into a considerable number of circuits,") is established. Such, then, were Professor Wheatstone's practical advances, (his 'Scientific Researches' being unreservedly admitted,) from 1823 down to 1837. On the 27th of February in the latter year he becomes acquainted with my brother. At that date, the existence of my brother's 'Plans and Instruments' and his entire devotion to the development of the practical Electric Telegraph for the twelve preceding months, are recognised by the Arbitrators. Early

in the following May he becomes my brother's partner and co-patentee. During these two months something occurs, which establishes a contrast, striking and remarkable in the last degree, between the sterility of the preceding fourteen years and the practical fertility of this short period:—a contrast, which draws from Professor Daniell, the future judge, these strong expressions of enthusiasm:—

“I am quite surprised at,” (he writes to Professor Wheatstone, on the 16th January, 1838,) “and almost at a loss to account for, the different effect produced upon my mind by *believing* and *seeing*. I had followed, as you well know, all your experiments from the beginning; . . . but, nevertheless, when I saw it, (Cooke and Wheatstone's Telegraph,) in action upon the Birmingham railroad, I was struck as with something quite new, . . . producing even in me something of the feeling of magic. . . . I now feel satisfied that, not only must the Telegraph be adopted upon all railroads immediately, but that it will be very speedily had recourse to upon an extensive scale for private communications between great commercial stations.” Vol. i.. p. 59.

Professor Daniell must have subsequently discovered some explanation, unsuspected at the time, of the ‘surprise’—the ‘magic’ effect—of the transition from Professor Wheatstone's ‘experiments, which he had followed from the beginning,’ to the ‘something quite new’ of ‘Cooke and Wheatstone's Telegraph,’ at Euston Square, when, as co-Arbitrator with Sir I. Brunel, he recognised my brother in his Award of 1841, as “the Originator of the undertaking,” and adjudged him “entitled to stand alone, as the Introducer and Carrier-out of the Practical Electric Telegraph.”

Professor Daniell must, in 1841, have discovered something, (unexplained and unsuspected in 1838,) when, in contrast with the honours thus awarded to my brother, he merely recognised in Mr. Wheatstone's favour those “researches—profound and successful researches—which had prepared the world to receive the project:”—when, in a word, he merely recognised Mr. Wheatstone, as having shown the world the *possibility* of that, which my brother DID:—DID, I beg leave to add, *in entire ignorance of those researches*.

By what conclusive evidence my brother's Instruments and my brother's System, as complete in their essential parts and as designed for practical application, were proved to have been invented by him before he became acquainted with the researches either of Mr. Wheatstone, or of other philosophers, is expressly stated in Mr. Wilson's Address. Vol. ii., p. 151—2.

“Mr. Cooke's DETECTOR, to trace defects from water, fracture, or contact; his RECIPROCAL COMMUNICATOR, to convey signals backwards and for-

wards, visible simultaneously at both termini; and his ALABUM, to attract attention;—these essential parts being applied to a complete alphabet of signals, and projected from the first with a direct practical view to Railways, Commerce, and Government;—these things will be proved to you, gentlemen, by extant instruments, by written evidence, and by the unexceptionable testimony of Mr. Hoppner, to have been invented by Mr. Cooke within three weeks after he took up the subject, with little or no aid from theory, and *in ignorance of the unavailing experiments of the scientific world.*"

(To be continued.)

I am, Sir, &c.,

The Chesnuts, Guildford.

T. FOTHERGILL COOKE.

LETTER III.

JUDGMENT BY ARBITRATION.

SIR,

In my last letter I extracted from the Case, drawn up under legal advice by Professor Wheatstone, and laid by him before the Arbitrators, his alleged "Publication of his Experiments," and his alleged "Practical Advances," before he was acquainted with my brother.

I also extracted the Evidence laid by my brother before those gentlemen, which so effectually convinced them of the groundless nature of the Professor's allegations in these respects, that they excluded them absolutely from any recognition in the Award.

Professor Wheatstone thereupon yielded up every claim he had advanced to "Priority," and to the "Origination" of the Practical Electric Telegraph; and acknowledged my brother to be "Entitled to stand alone." He also admitted the existence in 1836 of my brother's "Plans and Instruments;" whilst he suppressed the puff of the imaginary "Thirty-signal Instrument" in the Magazine.

Nevertheless, in his answer to my brother's Pamphlet of 1854, he not only revived the "Puff of the Magazine," but also attempted to explain away some of those Substantive Claims on my brother's part, which he had already solemnly endorsed on two distinct occasions; first, and more generally, in an Arbitration under Sir Benjamin Hawes, K.C.B.; and, secondly, in greater detail, and with expressions of gratitude and cordiality, under the Brunel Arbitration.

The former Arbitration in "November, 1837, by a Partnership Deed, vested in Mr. Cooke, as the Originator of the (infant) Undertaking, the exclusive management of the Invention, and all the business profits arising from carrying it out, and eleven-twentieths of all receipts from licences."

The Brunel Award in 1841 not only recorded my brother's vested rights of 1837, as above quoted, but also, when four years later the Electric Telegraph was assuming

under his "Exclusive management" the character of a great National Enterprise, extended his title of "Originator" by declaring that to him "ALONE this country was indebted for having practically introduced and carried out the Electric Telegraph as a useful undertaking."

I now proceed with Extracts showing how the Professor's attempts, in his Pamphlet, to explain away my brother's "substantive claims" as the "Originator" of the whole Telegraphic System, were encountered by Evidence, and defeated as signally as his own pretensions to that position had been defeated by the Award in 1841.

As introductory to these extracts, I quote from Professor Wheatstone's Answer of 1856, (vol. i., pp. 79, 80,) certain concessions, he then made, towards the establishment of those claims. Some of these concessions have been collected by my brother in his Reply, *ibid* pp. 133—4. From these we learn that—

"Mr. Wheatstone entirely adheres to the statement of his solicitor that, 'He does not desire to escape from a single conclusion, which the Award warrants;' that he contentedly accepts all that it does warrant;" (and he himself writes):—"In the sense of the Award Mr. Cooke may stand alone, without the slightest complaint from Mr. Wheatstone, 'as the gentleman to whom this country is indebted for having practically introduced and carried out the Electric Telegraph as a useful undertaking, promising to be a work of national importance:' that Mr. Cooke may fairly take an honourable pride in this testimony to his practical discernment and business capacity; and no one will be more willing, than Mr. Wheatstone has ever been, to acknowledge that, in this sense, he has been the main-spring of their enterprise: that Mr. Cooke is entitled to stand alone, with the assent of the Arbitrators, for conceiving, and energetically following up his conception, that the Electric Telegraph might be made a profitable commercial enterprise, and for his having carried out an undertaking of such great importance to the public: and that his talents and zeal, his experiments, his negotiations, his mechanical and business arrangements, entitle him to stand alone, to every intent and purpose which the language of the Award warrants." (Wheatstone's 'Answer,' vol. i., p. 80.)

On which my brother drily remarks:—

"I accept this testimony from Professor Wheatstone, *as far as it goes*. But, let any man of common sense, let any friend of his own, compare the article on the Electric Telegraph which appeared in the 'Quarterly Review,' for June, 1854, with the Award, by which Mr. Wheatstone, in the complimentary language just quoted, now submits to be bound." Vol. i., p. 134.

But to proceed. My brother, while exhibiting all the Facts and Evidence of his Case, urged before the Arbitrators in 1841, as clearly evincing *his admitted priority*,

the following *three* points—points settled by agreement* immediately before the first patent was applied for :—

- (1.) "That with Mr. Wheatstone's consent his name took the lead in the first patent.
- (2.) "That Mr. Wheatstone paid £80, and he only £50, towards the expense of it ; and—
- (3.) "That, as proved by Mr. Wheatstone's writing, Mr. Cooke was allowed £130 for past experiments ; whereas Mr. Wheatstone was allowed *nothing* for his." Vol. ii., p. 30.

The extreme significance of these points—superadded to my brother's "Exclusive rights, and large benefits, vested in him as Originator of the Undertaking,"†—is set forth at length ; and Mr. Wilson thus further exhibits their importance :—

"That the slender financial means of both parties made these sums so important a consideration at the time, that a leading feature in the 'agreement' was, that a share of the patent should be sold to meet them." Vol. ii., p. 137.

Mr. Wheatstone could not pass these simple facts, (two of them at least,) unquestioned. In his "Answer" of 1856 he says :—

"Mr. Cooke lays eager stress on the fact that his name *was permitted* in the first patent to precede that of Mr. Wheatstone. To this it may be replied, that Mr. Cooke had effected this arrangement *without Mr. Wheatstone's assent*, and that Mr. Wheatstone subsequently expressed his disapproval of the proceeding." Vol. i., p. 63.

My brother in reply prints the heads of the agreement of the intended partnership, drawn up and signed on the morning of the application for the first patent. In these "heads," which are in my brother's hand writing, some words are represented only by their initial letters ; thus :—

"Heads of Agreement.—That a joint patent be taken out for an E. M. T., &c., for the benefit of the joint inventors, W. F. C. and Mr. W., subject to the following agreements, &c." Vol. i., p. 151.

* This "Agreement" was discussed and settled in the Chambers, and in the presence, of Mr. LANE, in May, 1837. It was confirmed in November, 1837, against the encroachments of Mr. Wheatstone, under the Arbitration of Sir B. Hawes, by THE DEED vesting in my brother the large privileges often quoted in these Letters. And that DEED was recorded by the Arbitrators, and accepted by Mr. Wheatstone, in the Award of 1841. In both these Arbitrations Mr. LANE was a forthcoming Witness. When, in 1856, Mr. Wheatstone attempted to impugn the value of two of the three points mentioned in the text, Mr. LANE was no longer living.

† See these large "VESTED RIGHTS AND BENEFITS OF THE ORIGINATOR," recorded in the Award, p. xxviii.

These initial letters are cancelled by Mr. Wheatstone, and he interlined in full, in his own hand writing, the words printed in Italics ; thus :—

“Heads of Agreement.—That a joint patent be taken out for an *Electro Magnetic Telegraph, &c.*, for the benefit of the joint inventors, *William Fothergill Cooke, Esq., and Charles Wheatstone*, subject to the following agreements, &c.” Vol. i., p. 151.

*The words in Italics are, I repeat, in the hand writing of Mr. Wheatstone himself.** Yet Mr. Wheatstone put in print, in his “Answer” quoted above, that *Mr. Cooke effected the arrangement without his assent, and that he subsequently expressed his disapproval!*

The 2nd point, viz., that he paid £80, and my brother only £50, towards the expenses of the patent, he passes—*sub silentio*.

To the 3rd point Mr. Wheatstone takes this exception : “Mr. Cooke made a *second point*”—(he slurs over the circumstance, that he has passed my brother’s *second point* unnoticed, and really proceeded to his third) :—

“Mr. Cooke made a second point of his statement, that, at the outset, the partnership account was charged in his favour with £130 for the expenses of his ‘*past experiments*.’ The facts were, Mr. Cooke *had several instruments, which he had been at some expense in constructing*—as an inducement to Mr. Wheatstone to acquiesce in allowing £130 for them out of the future profits, Mr. Cooke informed him that a portion of *these instruments* would be his, and that he might add them to his collection at King’s College.” Answer of 1856, vol. i., p. 64. (My brother replies :)—

“My 3rd point Mr. Wheatstone attempts to get rid of by one of those unlucky assertions, which it is his habit to put forward, without evidence, or against evidence, whenever he has anything to account for. He has forgotten that, in the joint account, the allowance is for ‘*prior expenses*,’ *not for ‘instruments,*’ authenticated by his own initials in a book, of which he has the duplicate, as follows :—‘1837, May. W. F. Cooke’s *prior expenses* to be deducted from the first produce under the patent—£130. W. F. C. —C. W.’” Reply of 1856, vol. i., p. 151.

It is almost superfluous to say, that Professor Wheatstone received no such promise, and that he never did add any of these instruments “to his collection at King’s College.” The Truth is obvious. The Professor was admitted to a very liberal share in my brother’s Patent, “Plans, and Instruments,” only as his Scientific Coadjutor.

* The letters, and other documents of the Arbitration, have all been preserved by my brother’s Solicitor, Mr. Wilson.

I have thus shown by extracts how the Professor's attempts to explain away my brother's substantive claims have been encountered by the Evidence;—viz., that his allegations in this respect, like his allegation of Practical Advances in his own behalf, have been proved simply untrue.

The substantive claims, thus impotently assailed by the Professor in 1856, had already triumphed in the arbitration of 1841.

Mr. Wheatstone's claims to Priority having been shattered, while my brother's claims, as Originator of the enterprise and as Inventor of his instruments, remained in their integrity, the Award of the Arbitrators was drawn in accordance with these admitted results.

Still Mr. Wheatstone made one final, desperate, struggle to gain the first place, by transposing certain paragraphs of the draught, so as to give precedence to the statement of his researches. My brother's peremptory refusal to allow the alteration is found in his letter to Professor Daniell, Mr. Wheatstone's Arbitrator, on the day preceding the signature of the Award.

"Professor Wheatstone has transposed the paragraph so as to give precedence to his name. To this I cannot consent." Vol. i., p. 140.

"Mr. Wheatstone's transposition of *paragraphs* was reversed accordingly, and he was obliged to take the second position for his discoveries as well as for his name. The Professor's more intimate friends will feel that the surrender was not, in either case, a trifling one."

In his Answer, of 1856, he thus glosses over the fact:—

"Mr. Wheatstone was required to sign the paper (the Award). He did object at the time to the wording, as likely to lead to misconception, but as it contained *no real discrepancy with his own statements*, (!) he consented that it should stand." Vol. i., p. 79.

This last humiliation he forced upon himself by his own pertinacity.

Backed by the Partnership Deed of 1837, by the Plans and Instruments of 1836, by the Drawings, by the Pamphlet of 1836, by the cogent and multifarious Evidence, and by unimpeachable Witnesses, ready to give their Testimony, my brother's claims assumed in the judgment of the Arbitrators the character of undeniable "FACTS."

These claims, and the groundwork on which they rest, are clearly recognised in detail by the statements of the Arbitrators, which

"Statements all had reference to a controversy explained at great length by the respective parties, in printed Cases, and relating almost exclusively to *the origination of the practical Electric Telegraph, which had come into use, as contrasted with the philosophical experiments which had prepared the way for it.*" Vol. i., p. 142.

The different reception accorded by these statements of the Arbitrators to "the exactly balanced but antagonistic claims" of the disputants, will strike the mind more forcibly in contrast, if the passage in which Mr. Wheatstone has so precisely confronted them be once more placed in view. I therefore repeat that extract. Professor Wheatstone writes :—

"You forget that all you have put forward at the conclusion of your letter as the 'broad basis of your claim,' *is equally applicable to me*. Your words are, 'that alone, unaided, and unadvised, you projected, and after five years of indefatigable perseverance amid the greatest difficulties, have now introduced into daily use your own project of a Practical Electric Telegraph, which in theory had remained for many years a plaything in the hands of scientific men, and might, but for your exclusive devotion to it from the first day the idea occurred to you, have remained so till this day.'" Vol. i., p. 123.

Now mark the different reception of these claims. The Arbitrators affirm that,

"In March, 1836, Mr. Cooke, while engaged at Heidelberg in scientific pursuits, witnessed, for the first time, one of those well-known experiments on electricity, considered as a possible means of communicating intelligence, which had been tried and exhibited from time to time, during many years, by various philosophers ;—that struck with the vast importance of electric communication to the infant railways, as well as to Government and general purposes, and impressed with a strong conviction that the great object was attainable, he immediately directed his attention to the adaptation of electricity to a practical system of Telegraphing—gave up his profession—and, from that hour, devoted himself exclusively to the realization of that object ; —and that he came to England in April, 1836, to perfect his plans and instruments." Award, p. xxvii.

Contrast this energy—this abandonment of profession—this presentiment of eventual success—this practical realization of "*Plans and Instruments*," the fruit of one short month—with the toying of "various philosophers, during many years," all without practical result.

Contrast all this—not with Mr. Wheatstone's "summary of his researches," the scientific value of which has never been impugned—but with his sole *awarded* practical hint towards a practical Electric Telegraph, viz., "his original method of converting a few wires into numerous circuits"—i. e. the principle of his "key-board,"—which sole practical fruit of his profound and successful researches, extending over the fourteen years from 1823 to 1837, *has never been used anywhere*.

The Arbitrators, untrammelled by the delusive pleadings of Mr. Wheatstone, proceed to record, that, as a natural result of my brother's origination—

"There was vested in him, as the originator of the undertaking, the exclusive management of the invention—the exclusive engineering—and all the benefits arising from laying down the lines, and from the manufacture of the instruments."

Whose instruments? we naturally ask—Whose, but his own? Twice have the Arbitrators recognised his instruments in this Award; and they have recognised none other. And finally they announce that he, my brother,—

"Is entitled to stand alone, as the gentleman to whom this country is indebted, for having practically introduced and carried out the Electric Telegraph, as a useful undertaking." Award, p. xxix.

"To whom *this country* is indebted," say the Arbitrators. As time discloses facts, and truth matures, reliable historical testimony extends his claim. The eminent electrician, Mr. Cromwell Varley, in his letter of November 21st, 1866—a letter which has been copied into many papers—bears testimony to this effect:—

"When we consider the question as to whom," (not this country alone, but) "*Europe* is indebted for the introduction of the telegraph, as a great commercial undertaking, then the credit must undoubtedly belong to Mr. W. Fothergill Cooke." (And again in the same letter,)—"Many philosophers have invented electric telegraphs; many had foreseen their great use; but the one man of indomitable energy, perseverance, and foresight, who took the matter up, and forced the public into its recognition, is undoubtedly William Fothergill Cooke."—*The Dublin Express*, November 21st, 1866.

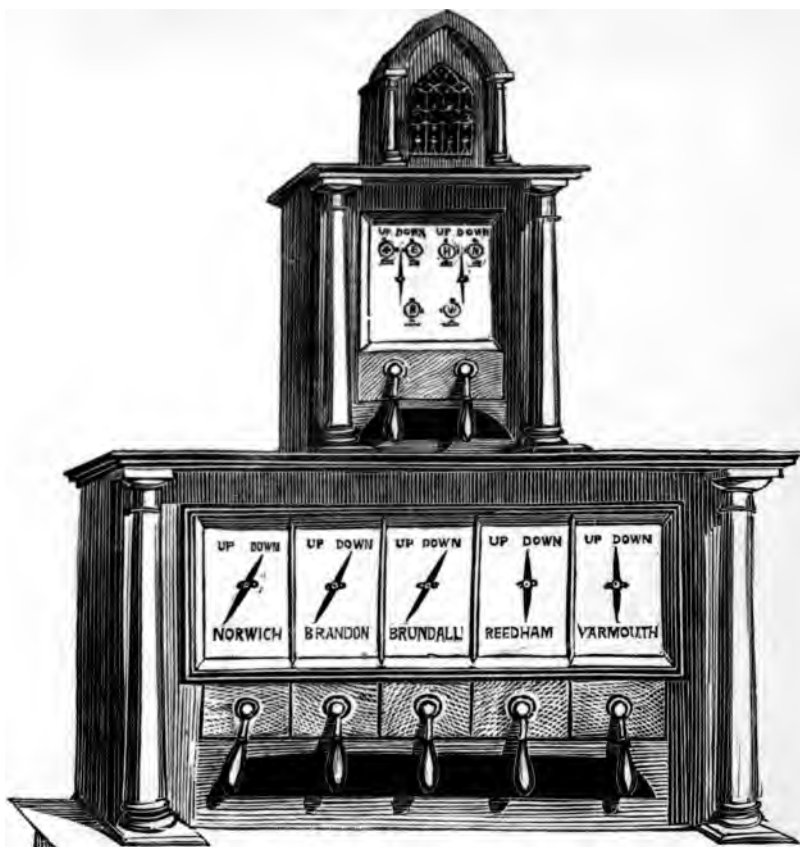
In contrast—in direct antagonism—to a judicial verdict—to all authentic testimony—the "Quarterly Review," the "Times," the scientific coteries of London, persistently proclaim, *with demonstrated injustice*, "*another name alone, another name instead.*"

(To be continued.)

I am, Sir, &c.,

The Chesnuts, Guildford.

T. FOTHERGILL COOKE.



THE ELECTRIC TELEGRAPH

USED ON THE
YARMOUTH AND NORWICH RAILWAY,

WHEN OPENED AS A "SINGLE WAY,"

1st May, 1844,

Showing the two-needle and the one-needle telegraphs, with the vertical handle, viz. :—

The alarum at the top ;

The two-needle telegraph for general purposes.

Five separate single-needle telegraphs communicating independently, by their simple signals, with five stations.

The alphabet of the single-needle telegraph is shown at page 23.

LETTER IV.

THE MAGNETIC-NEEDLE TELEGRAPH OF GREAT BRITAIN.

SIR,

By extracts in my former letters I have dissipated, as mere imaginary matter, the alleged "Practical advances" of Professor Wheatstone, whether as regards his "Submarine ropes," or his "Proposed establishment of electric telegraphs upon railway lines," or his "Apparatus as at present constructed."

I have shown his "Champion statement" of the "Priority of publication in the Magazine" to his acquaintance with my brother to have been absolutely disproved in the arbitration by the Evidence of a post-office stamp. That disproof, which was accepted by him in the Award, condemns as wilful misrepresentation of Facts *his subsequent appeals* to that "Priority."

And I have no less completely suppressed his feebly-revived attempt, in 1856, to invalidate my brother's substantive claims, as Originator of the Telegraphic Undertaking, and as Inventor of his Instruments, by the Evidence of his own hand-writing.

Being thus brought within the region of facts, I proceed to the great fact of Electric Telegraphy,—

THE MAGNETIC-NEEDLE TELEGRAPH APPARATUS OF GREAT BRITAIN.

This is the form of signal-apparatus, which is peculiar to the Telegraph in Great Britain, and which in the year 1837 introduced a new era in civilization.

So far back as 1802 Grandominico Romagnosi published at Trent his discovery that the magnetic needle was deflected by galvanic currents. To this discovery Oersted in 1819 directed more effectually the attention of scientific men; and in 1820 Ampère suggested that it might be possible to make use of the deviation of the needle under the influence of an electric current for telegraphic purposes. In 1824 Schweigger invented his "multiplier coil," or Galvanometer; and presented the world with a com-

plete little instrument, fitted at once for giving signals at a distance. But it was not till 1830 that Baron Schelling, the first *builder up* of a Magnetic Needle Telegraph, had so far turned Romagnosi's "discovery," Ampère's "suggestion," and Schweigger's "multiplier coil," to practical account, as to present to the Emperor Nicholas a working Telegraph, which the Emperor "had been pleased to notice in its earlier stage." From this date telegraphic experiments with the Magnetic Needle Multiplier Coil became popular in scientific lecture-rooms, and the instrument itself, under the name of "Galvanometer," was used as an ordinary experimental instrument for measuring the force of electric currents.

Professor Wheatstone showed such experiments with two galvanometers at King's College, certainly in 1836, if not at a much earlier date. (See diagram, vol. i., p. 155.) The Professor records, on the authority of S. Jacobi, that "Baron Schelling exhibited his Magnetic Needle Telegraph at the meeting of German naturalists at Bonn in 1835." Vol. ii., p. 88.

It appears that Professor Müncke, of Heidelberg, was at Bonn on that occasion, and, on his return, made models of parts of Schelling's apparatus, and exhibited them in his lecture-room at Heidelberg, where my brother saw them in March, 1836. These models, made by Professor Müncke, are accurately delineated in the Arbitration papers, Part A, vol. ii. Within a month after seeing Müncke's models my brother worked out his ideas of a practical Telegraph in two complete working instruments. These instruments were seen by the Arbitrators at King's College, and drawings made from them in detail are given in vol. ii., Part B.

Thus my brother and Professor Wheatstone started alike from Baron Schelling's Magnetic-Needle Telegraph of 1830. Each pursued his ideas quite independently of the other down to the date of their first acquaintance on the 27th of February, 1837.

The results of their labours after that date were two very distinct Telegraphic instruments, bearing a marked difference in their action and effect. It was the *essential distinctiveness* of these two forms of the Magnetic Needle Telegraph which fully justified the Arbitrators in recording in their "Award," that Messrs. Cooke and Wheatstone stood on "a footing of equality for their existing inventions."

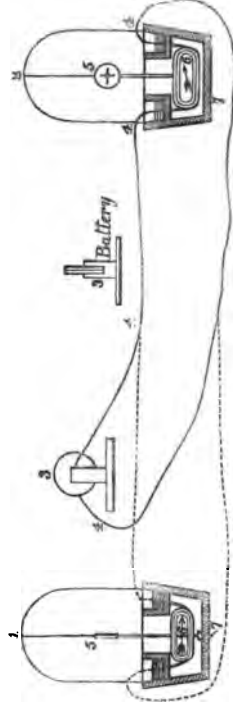
In his pamphlet of 1856, Professor Wheatstone thus stated and limited his claim to his own peculiar form of the Needle Telegraph.

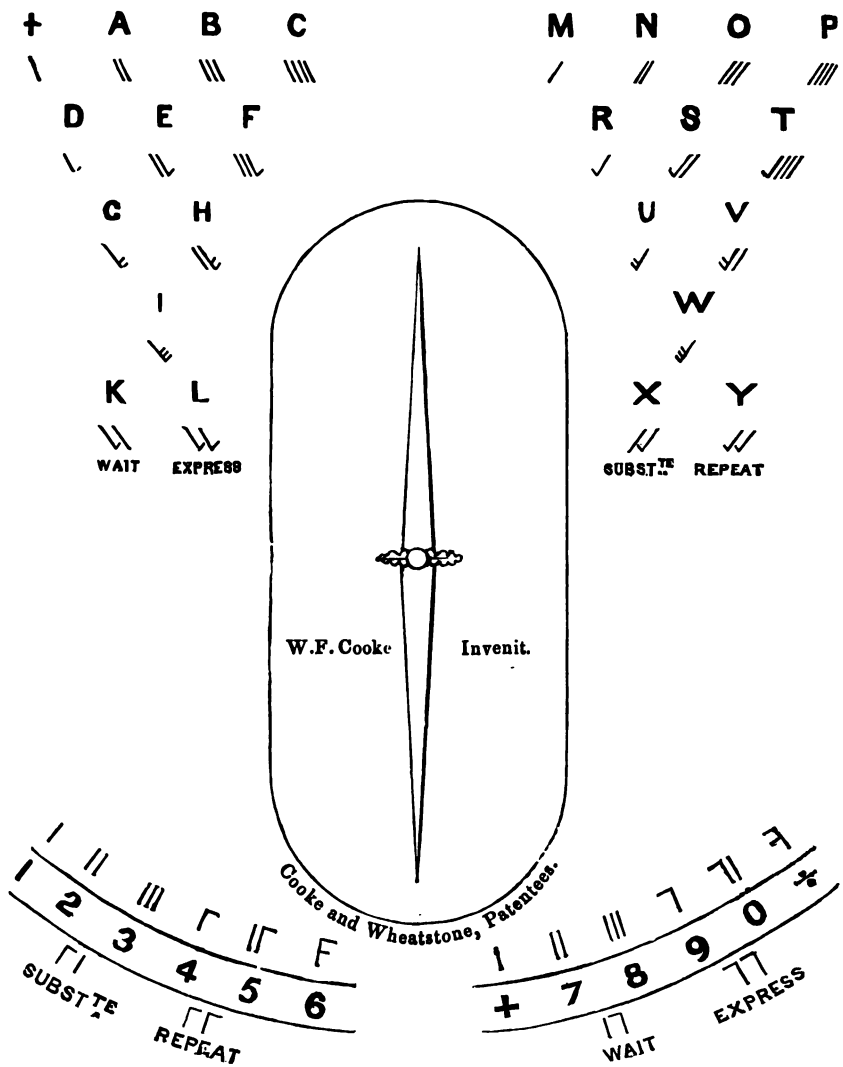
"With regard to the subsequent development of my first Telegraph, the *essential principles* of which are the formation of numerous circuits from a few wires, and the *indication of characters by the convergence of needles*, I am indebted to no person whatever, it is in all its parts essentially and entirely my own." Vol. i., p. 114.

ILLUSTRATION TO THE THIRD EDITION.

Arbitration Documents, Vol. II.

Professor Muncke's Instrument (found by Dr. Hamel, in Muncke's Lecture Room at Heidelberg, in 1859), and drawn in Plate A, Vol. II., by Mr. Cooke for the Arbitrators.





ALPHABET OF THE SINGLE-NEEDLE TELEGRAPH.

First used on the Blackwall Railway, 1841.

It is fortunate that I am able to disembarass this claim of Professor Wheatstone of all rivalry by unreservedly admitting it; so far, that is, (and I believe Professor Wheatstone means no more,) as it is represented by the Diagram, vol. i., p. 155, which shows his key-board, and again by the Diagram, *ibid* p. 188, which shows his "*subsequently-developed* Hatchment Dial." *The date of the invention of the latter being after the patent was applied for.**

In proceeding with my Extracts, I shall confine myself for the present to the perfected "Hatchment Dial" and "Key-board" of Professor Wheatstone on the one side, and to my brother's perfected "Heidelberg Telegraph" on the other. I take up my brother's narrative at the 192nd page of his first volume, where, in order to compare the Instruments, he concedes the use of *his own* reciprocal system, without which Mr. Wheatstone's "Dial" was not a Telegraph at all.

"The distinction between Mr. Wheatstone's instrument and mine, *assuming my reciprocal principle*, (presently to be explained,) *as the basis of both*, may be described as a distinction between duality and unity of action. Each of his *simple* signals was exhibited by *the convergence of two needles* deflected by a current overcoming the resistance of *two sets of coils*, and was produced by the depression of *two separate keys, being the terminations of two conducting wires*, upon the metallic connections with the battery. On the other hand, each of my signals was exhibited by *one needle* deflected by a current transmitted through *a single set of coils*, and was produced by the movement of *a single key* or handle, turning on *a horizontal axis*, which, being the continuation, not of a conducting wire, but of *the two poles of the battery*, produced the transmission of a current in one direction by a single movement to the left, and in the other by a single movement to the right: the signal-man being able to transmit all his signals without relinquishing his hold of the two handles of his instrument; and his working being further facilitated by a constant parallelism of the position of the handles with the position of the pointers on the dial; a great assistance to the beginner.

"My instrument, (The Magnetic Needle Telegraph of the English Railways,) was an independent development of the simple original principle of my earliest instrument. The telegraph of the present day consists of two of the three portions of my Heidelberg telegraph, of March, 1836, *improved by Mr. Wheatstone's dry battery contacts, and his vertical needles*, by my 'return wire,' and by the adoption, from my mechanical telegraph, of March, 1836, of the self-acting draw-bridge for the return of the electric current.

* That the invention of the "indication of signals by the convergence of needles" was made subsequently to the application for the patent was significantly and discreetly admitted by the Professor in his letter to my brother in 1840, where he speaks of it as a "*subsequent development*." There he definitely limits his own peculiar form of the needle telegraph in these words;—

"My time, after I became acquainted with you, was exclusively occupied in perfecting my own instruments, which had nothing in common with yours." Vol. I., p. 114.

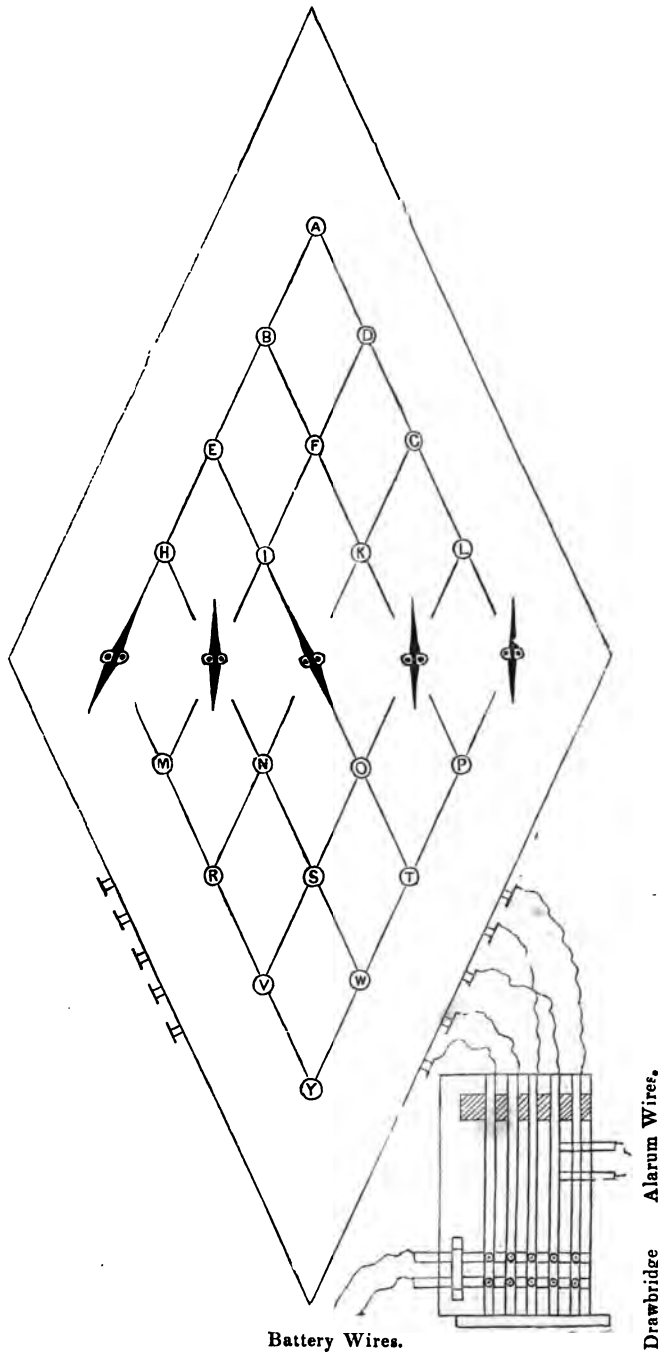
"As a further illustration of the distinction between Mr. Wheatstone's Hatching Dial with its Permutating Key-board, and my Two Needle Telegraph, let it be supposed that two vertical needles had been applied to two of the circuits in each of my two Heidelberg instruments of 1836. My horizontal needles would thus have been replaced by vertical needles, and we should have obtained a reciprocal telegraph, giving, *by two needles and two keys, eight simple signals*, exactly like those of the present day; Mr. Wheatstone's instrument giving only *two simple signals by two needles and four keys*. Here, however, I should have required *four wires against his two*. But, in April, 1837, I introduced the improvement of the '*return wire*,' a wire common to the two needles, which reduced the number of my wires from four to three. At a still later period, my plan of suspending the wires in the air, the subject of my patent of 1842, enabled me, by its improved insulation, to avail myself of the conducting power of the earth, as a substitute for the return wire, thus reducing my three wires to two. I thus gradually imparted to my *two-needle telegraph* the capability of giving, *by two wires and two keys, eight signals by simple movements*, and an entire alphabet by combinations; while Mr. Wheatstone's instrument, (to which, from its essential nature, my improvements cannot be applied,) remains in its original form, at King's College, and would, if reduced to an *equal number of wires*, only give, *by a double number of keys, two simple signals*. But it would be incomplete if deprived of any one of its five wires, or its five needles, or its ten keys." Vol. i., pp. 192—5.

On the employment of the conducting power of the earth to complete the circuit, thereby dispensing with the '*return wire*,' my brother quotes the following from the Abbé Moigno:—

"Dans une note lue en Avril ou Mai, 1843, dans une réunion de la Société des Arts, M. Cooke, disait que, en 1841, il avait constaté par des expériences sur le chemin de Blackwall, que la terre pouvait remplacer pleinement la moitié du fil conducteur ou le fil de retour ('the return wire'). Voici textuellement ses paroles: 'La terre agissant comme un grand réservoir d'électricité, ou sous quelques rapports comme un excellent conducteur, la résistance offerte à la transmission du fluide électrique est grandement diminuée, et la pile peut agir à une bien plus grande distance avec un fil conducteur d'un plus petit diamètre.' "

My brother, in 1838, on the Great Western Railway, taught his assistants to employ the earth as part of the circuit, when testing the wires with his Detector. By priority of publication Professor Steinheil has since claimed this discovery. It was not, however, new. The Abbé continues—

"Sir William Watson constata le 14 Août, 1747, à Shooter's Hill, qu'un circuit formé de deux milles de fil de fer, et de deux milles de terre humide était franchi par l'électricité dans un temps inappréciable, insaisissable." Vol. i., p. 194.



MR. WHEATSTONE'S "HATCHMENT DIAL."

Exhibiting letter E by the convergence of two needles. His key-board altered to introduce Mr. W. F. Cooke's alarum and drawbridge for reciprocal communicator.

1. The first part of the document is a list of names and addresses of the members of the committee.

2. The second part of the document is a list of names and addresses of the members of the committee.

Trusting that the above Extracts have fixed in the reader's mind the characteristic distinction between my brother's "*single needle*" Telegraph of 1836, and Professor Wheatstone's Telegraph with "*converging needles*" of 1837, I proceed to show, that each of them was dependent upon my brother's general system of a "Reciprocal Communicator." *For it must be distinctly understood that mere signal dials alone, which may be indefinitely varied, DO NOT OF THEMSELVES CONSTITUTE A TELEGRAPHIC SYSTEM.* It was my brother's practical "Plans and Instruments," recorded in the *plural* by the Arbitrators in their Award, which justified them in declaring that he was "entitled to stand alone as the gentleman, to whom this country is indebted for having practically introduced and carried out the Electric Telegraph as a useful undertaking."

At page 18, vol. ii., and at 179 of his 1st vol., my brother thus describes to the Arbitrators, the order in which he built up his system, or "Plans :"—

"Within three weeks after the day on which I saw the experiment, (Möncke's,) I had made, partly at Heidelberg and partly at Frankfort, my first Electric Telegraph, of the galvanometer form, which is now at Berne. It has been written for, and shall be laid before the Arbitrators. (This was done.) I used six wires, forming three metallic circuits, and influencing three needles. I worked out by single, or combined, movements of these needles an alphabet of twenty-six signals. I had also invented the instrument which I called the DETECTOR; by means of which injuries to the wires, whether from water, fracture, or contact, are readily traced; an instrument which in practice is never out of my hand, and without which the Electric Telegraph would be impracticable. But my principal improvement was, that my Telegraph did not merely send signals from one place to another, but that it was, even at that early period, a *reciprocal telegraphic system*, by which a mutual communication could be practically and conveniently carried on between two distant places; the requisite connections and disconnections being formed by pressing the fingers upon keys, and the signals being exhibited to the person sending the communication, as well as to the person receiving it.

"This improvement was effected by placing a system of keys permanently at each extreme end of the metallic circuit, and providing each circuit with a draw-bridge of metal for completing the continuity of the wires, when signals were being received from the opposite terminus. The two signal apparatuses being thus thrown into the course of the metallic circuit, every signal was given at both ends concurrently; and the draw-bridge was made to restore the circuit for a reply, on the first communication being completed. *"This united and reciprocal property is the basis of the Electric Telegraph, and is inseparable from the practical system. It has been my leading principle throughout, and has impressed itself even upon the forms of my instruments: their distinguishing characteristic from first to last being, that*

my keys and signals have always been joined together into one instrument, and the several instruments into one reciprocal system. In a word, the Arbitrators will here recognise the earliest form of the RECIPROCAL COMMUNICATOR, the fundamental condition of the Electric Telegraph under every varied mode of its operation.

“ ‘Nothing is so easy,’ says M. Biot, ‘as the discovery of yesterday; nothing so difficult as the discovery of to-day.’ Professor Wheatstone had been repeating during many years his experiments with his keyboards, yet he *never altered them so as to adapt them to become parts of a reciprocal telegraph till I showed him how to do so*; and now he only says, ‘Any one could have done it.’ Perhaps so; but Mr. Wheatstone did not do it, and I did. “It appears then that this principle of combining, into one telegraphic system, two magnetic needles, included in the same metallic circuit, and moving simultaneously, one before the operator and the other before the recipient, on the passing of the current through the circuit, with keyboards at the two termini, each fulfilling alternately the active office of originating the current, while the instrument is transmitting signals, and the passive office of forming a bridge for the returning current, while the instrument is receiving signals, that this principle, I say, however simple, however undeserving of scientific approval, was the essential principle of Cooke and Wheatstone’s Electric Telegraph of 1837, as it had before been of my telegraphs of 1836, and as it has uniformly been of every Electric Telegraph since contrived. *That it was a new principle* is virtually admitted by Mr. Wheatstone’s unmeaning reference to Mr. Ronalds, and *was proved, in a court of law,* by the establishment, in an obstinate contest, of the validity of the patent.* Now this new principle was, by Mr. Wheatstone’s own admission, not his invention. Therefore it was mine.” Vol. i., pp. 179—181.

The Professor’s reference to Mr. Ronalds, as the Inventor of the “Reciprocal Communicator,” is thus answered:—

“Mr. Ronalds’ telegraph was not a combined system of apparatus, constructed so as to work reciprocally, but three separate and independent elements of communication, viz., two clocks and a line of insulated wire, arranged into a kind of partnership, for the purpose of producing combination of effect by coincidence of action. But although the principle of reciprocal communication is not to be found in Mr. Ronalds’ telegraph, it was ‘developed completely and effectively,’ in those magnetic needle telegraphs, which I made at Heidelberg in 1836; which were brought over to London for the purposes of the arbitration; which Mr. Wheatstone has seen; and of which he has an accurate drawing in his possession;” (Drawing, Part B, vol. ii.) Vol. i., p. 178.

(To be continued.)

I am, Sir, &c.,

The Chesnuts, Guildford.

T. FOTHERGILL COOKE.

* The Electric Telegraph Company v. Nott and others. Vol. i., p. 157.

LETTER V.

THE ALARUM, ETC.

SIR,

My brother proceeds to describe his Alarum ; and to defend it against a very feeble rival, in the person of Baron Schelling, and against one still more feeble, in the person of Professor Wheatstone himself. To that defence, as against the latter rival, I have been favoured with a startling addition in a printed official statement of Professor Henry, of New York. My brother says—

“Passing over the Detector, (one of the instruments included in the first patent, and which was indisputably mine,) I will deal first with Mr. Wheatstone's claim to the Alarum.

“Before the end of March, 1836, I had invented the Alarum, which is still extant in my first Mechanical Telegraph. It was one of ordinary construction, worked by clockwork mechanism on the removal of a detent. My invention consisted in placing a voltaic magnet in such proximity to an armature of soft iron forming the tail-end of a lever detent, that when an electric current passed round the voltaic magnet, the magnetism which was for the moment excited in it attracted the tail-end of the lever, and by so doing drew its detent-end out of the clockwork ; but on the temporary magnetism ceasing with the cessation of the current, the attraction of the tail-end of the lever ceased also, and the detent-end of it was then replaced in the clockwork by a reacting spring or balance weight.

“Mr. Wheatstone having failed to discover, after a careful investigation, any trace of a previous application of the attractive force of an electro-magnet to let off an alarum, that principle was claimed in our specification as part of the invention comprised in the first English patent ; and at a later date supported by Mr. Wheatstone's affidavit, in a trial in the Court of Common Pleas, our claim to the Alarum, *as an absolutely new principle*, stood the test of the severest scrutiny in a court of law.

“At an earlier period indeed, in his Case in the arbitration, Mr. Wheatstone tried to disparage my Alarum by referring to previous suggestions by scientific men at home and abroad of various modes, different, it is true, in principle from mine, by which the attention of the observer might be called ‘to

the telegraphic apparatus previous to a communication being made.' Among others he had mentioned that Baron Schelling of St. Petersburg, in 1833, caused a small watch-alarum to be discharged by a motion produced by the deflection of a magnetic needle."

Passing over Cavallo's and RONALDO's pistol and gas Alarums, produced by Professor Wheatstone in rivalry of my brother, I extract the following passage, taken from the Abbé Moigno, describing the Telegraph and Alarum of Baron Schelling.

"M. le Baron Schelling construisit à Saint-Petersbourg un télégraphe électrique qui consistait en un certain nombre de fils de platine isolés et réunis dans une corde de soie, lesquels mettaient en mouvement, à l'aide d'une espèce de clavier, cinq aiguilles aimantées placées dans une position verticale, au centre du multiplicateur. Il avait joint à son appareil un mécanisme fort ingénieux, dont l'idée était à lui, et consistait dans une montre à sonnerie, espèce de réveil, qui, lorsque l'aiguille tournait au commencement de la correspondance, était mise en jeu par la chute d'une petite balle de plomb que faisait tomber la point de l'aiguille aimantée."—*Moigno*, pp. 79 and 80. (My brother continues:)

"I have no claim to the vertical needle myself, and should have had no inclination to quote Schelling, in the first part of the foregoing extract, in opposition to Mr. Wheatstone's claim to it, but for his very unfair reference to the second part of that extract against me: indeed I always thought that he first found the 'vertical needle' described in an Italian work, in which the action of the multiplier on a dipping-needle is described. 'People who live in glass houses, should not throw stones.'"—*Vol. i.*, pp. 171—4.

In the beginning of his Case for the Arbitrators, Professor Wheatstone, after describing the failure of one attempt to produce an Alarum, goes on to say—

"I then proposed the *adhesive force* of an electro-magnet, the armature was to be brought to the magnet mechanically, and allowed to fall on the detent of the Alarum, whenever the circuit was broken. Mr. Cooke will recollect that I mentioned these things to him, *before I knew anything he had done.*" *Vol. ii.*, p. 85.

Unfortunately my brother, (like Sir Charles Fox on a similar occasion,) had no recollection of these ideas—ideas, (let it be observed,) *untried to the present day.* Mr. Wilson, in his address laid before the Arbitrators, is strong on this point:—

"*Not only is there no extant description of Mr. Wheatstone's supposed Alarum, in the specifications, or elsewhere; but it cannot be pretended by himself that it was ever at work anywhere, or ever tried anywhere, or ever made at all.*" *Vol. ii.*, p. 158.

Professor Henry, the 'Faraday of America,' however, has printed a description of

his own Alarum, actually in use, corresponding very closely to Professor Wheatstone's description. Professor Henry, Secretary of the Smithsonian Institute, at p. 111 of the "Report for 1857," speaks thus:—*Remark the date* :—

"In February, 1837, I went to Europe, and early in April of that year Professor Wheatstone, of London, in the course of a visit to him at King's College with Professor Bachs, explained to us *his* plans of an Electro-Magnetic Telegraph, and amongst other things exhibited to us *his method of bringing into action a second galvanic circuit*. I informed him that I had devised another method of producing effects somewhat similar. This consisted in opening the circuit of my large-quantity magnet at Princeton, when loaded with many hundred pounds weight, by attracting upwards a small piece of moveable wire with a small-intensity magnet connected with a long wire circuit; when the circuit of the large battery was thus broken by action from a distance, the weights would fall, and great mechanical effects be produced."—(The *adhesive force* being destroyed.)

Professor Henry's plan, slightly modified, becomes Professor Wheatstone's ideal Alarum. It seems a "remarkable circumstance" that Professor Wheatstone should not have announced to the American Professor that "*adhesive force*" idea, which he expected my brother to "*recollect*." It is also amusing that the "*method of bringing into action a second galvanic circuit*" was represented by Professor Wheatstone to Professor Henry as "*his method*," though he informs us that—

"As Mr. Cooke proposed to ring a bell by means of an electro-magnet, and also claimed an independent originality in the idea of effecting this action by means of a *secondary, or relay, circuit*, *Mr. Wheatstone has always represented this as a joint invention*." Vol. i., p. 55, note.

But this peculiarity repeats itself in every notice of the Telegraph derived from the same source. My brother does not quite admit the Professor's share in the invention of the "Secondary Circuit." It was foreign to all his plans till he became acquainted with my brother's Alarum and Mechanical Telegraph. The *unusual admission* that it was "a joint invention," savours strongly of correctness in my brother's notion that it was *all his own*.

I fear Professor Wheatstone's Alarum must class with his Enderby-sub-marine-Rope. What a statement is here again placed before us; where either a fancied recollection has to be filled in, or the ideas of another man to be appropriated! But Truth will out. Rumour speaks loudly that the charge of misappropriation is not confined to the Telegraph.

The irrepressible egotism of the Professor endangered the validity of the first patent.

"I proceed to explain," (says my brother,) "how it happened that Mr. Wheatstone's 'hatchment-dial' and 'key-board' were the peculiar forms of the Telegraphic Apparatus, represented in the drawings and descriptions of the first patent.

"The specification was drawn up by the late Mr. Farey, a gentleman recommended by Mr. Wheatstone, who placed the business in his hands. Mr. Wheatstone had been at work with him for some days before I was requested to attend, and he had, *perhaps not unnaturally, presented first to Mr. Farey's attention the peculiar forms of apparatus which he considered to be the representatives of his own share of the invention*: though, as I urged upon him with great stress at the time, he committed a grave error, as a patentee and a man of business, in having the drawings made according to his old permutating key-board, which was *superseded* in the Euston Square experiments, *and never appeared in any form again*. The day for the enrolment of the specification had arrived. We had all been in attendance on Mr. Farey day and night, ('Solicitor's fee for three nights' attendance' was proved by accounts,) and thirteen huge skins of parchment were already covered with writing. The description of my peculiar forms of the dial and key-board, of my intermediate and portable apparatus, and of my mechanical telegraph, for which the drawings had been prepared, would fill twice as many more skins.

"One important principle,—'the return wire,'—I was most anxious to get into the specification. Mr. Wheatstone's 'hatchment' form of dial, as I have explained, only gave signals by the combined movements of two needles, not by the separate movements of the needles singly, as in my Heidelberg Telegraph. I always felt, as experience has proved, that single-needle movements must, from their simplicity, supersede in practice any form of apparatus which would increase unnecessarily the number of needles employed, and double the resistance of the coils. A very warm discussion arose upon this point; I urging the great practical importance of the simpler arrangement, and Mr. Wheatstone objecting that it would spoil the symmetry of his dial. Convinced that I was right, Mr. Farey, on the last day, took from one of the drawings, left undescribed, an alternative illustration of an apparatus to work with a return wire, and added it, in red ink, to the drawing prepared upon Mr. Wheatstone's instructions.

"The detector having been squeezed in at the end of the last skin of description, and sketched end-ways in the last sheet of drawings, (from which sheet was cut off other matter drawn, but which could not be described in time,) the specification was acknowledged before Mr. Wheatstone's friend, Sir Giffin Wilson, one of the masters in Chancery, who had, at his request, kindly *sat up for us*, and was handed in at the proper office *at a few minutes before midnight on the last day*, to a clerk who had remained there to receive it." Vol. i., pp. 181—3.

My brother was much hurt at this egotistic and unbusiness-like proceeding of Professor Wheatstone. Mistrusting the sufficiency of this imperfect patent—

"He took out a second English patent, to secure the valuable matter which had been omitted. After the first of these English specifications had gone in, time enough remained for the enrolment of the Scotch and Irish specifications more leisurely. Mr. Farey, therefore, added to the matter which had been enrolled in England, the drawings of those portions of the magnetic needle telegraph which had been left out, together with a suitable description of the instruments to which they referred, and some small further additions; and the whole, comprising the two English specifications, was enrolled at Edinburgh and at Dublin as one specification.

"These combined specifications represent two distinct forms of the Magnetic Needle Telegraph, essentially differing in principle from each other, but *both founded on my reciprocal principle: viz., the Hatchment Instrument, and permutating key-board of Mr. Wheatstone; and my Two-Needle Instrument, founded on my Heidelberg Telegraph of March, 1836.* For the moment, indeed, the necessity of linking the two descriptions together, in the hurry of the first specification, led Mr. Farey to entangle my Heidelberg keys with the double movements of the permutating key-board, but in the first practical application of the telegraph, which took place soon afterwards on the Blackwall line, where practical simplicity was essential, I freed the Heidelberg key from this imperfection, by simply going back to the principle on which I at first applied it.

"Now Mr. Wheatstone's 'hatchment' instrument and the permutating key-board, to be seen at King's College and only there, have never come into practical use. Mr. Wheatstone reluctantly admits this. 'This instrument,' (he says,) 'has not been discontinued on account of its inefficiency: the sole reason that it is not at present in extensive use is the expense of the conducting wires.' Moigno notices the same drawback:—'*Un très grave inconvénient du premier * télégraphe de M. Wheatstone était la multiplicité des fils; cinq fils, c'était beaucoup trop de complication et de dépenses.*'—*Moigno*, p. 89. On the other hand, my one-needle and two-needle telegraphs, with the Heidelberg key, as first applied with my vertical handle on the Blackwall line in 1839, is the telegraph now in practical use all over England."

The opinion of it on the Continent, as well as in England, may be gathered from the testimony of the Professor's friend, M. Moigno:

"'Tout les juges compétents s'accordent à dire que le plus excellent des télégraphes électriques, généralement parlant, est le télégraphe à deux aiguilles que nous venons de décrire. Quoiqu'il exige l'emploi de deux fils, il mérite la préférence dans le plus grand nombre des cas, à cause de sa simplicité, de

* The *second* Telegraph, implied by these words, was Mr. Wheatstone's form of the *Mechanical Instrument*, (an improved variation of my brother's *Mechanical Instrument* of 1836, explained in *LETTERS VI.*), which was afterwards secured, together with an improved variation by my brother, under the patent of 1840,—a patent, which expired without coming into use.

son infaillibilité presque absolue, de la facilité avec laquelle les manivelles se prêtent aux mouvements à exécuter, de la rapidité de transmission des dépêches, &c., &c. Aussi le télégraphe à deux aiguilles est-il le plus universellement adopté en Angleterre. M. Bréguet nous a affirmé que s'il avait été libre, que si l'administration ne s'était pas cru liée par les antécédents du télégraphe de Chappo, il n'aurait pas hésité à installer sur les lignes françaises le télégraphe à deux aiguilles.' *Moigno*, pp. 391—2.

"There was indeed something very taking in Mr. Wheatstone's hatchment dial. Its diamond form, and converging lines, quite eclipsed my unpretending arrangement. As an attractive exhibition of a new and untried principle of communication, for the approval of influential persons likely to take it up, it in some respects merits the praise which Mr. Wheatstone has bestowed upon it. But, the dazzling confusion of its five needles, moving almost together, never could compete with the simple and rapid movements of the instrument which I proposed. In the law proceedings upon the *first English patent*, the chief ground of objection suggested by the defendants was the fact that the telegraph in the form first specified—the hatchment dial and permutating keyboard—*had never been used*." Vol. i., pp. 184—9.

Besides arranging a "Portable Telegraph," to be carried with the trains, which was capable of being applied to the suspended wires on any telegraphic line; and a "Train Telegraph," patented in 1842, to communicate between Guard and Driver; my brother conceived, in 1836, and gradually perfected, his "Intermediate Telegraph."

"This," (he says,) "was an essential part of my earliest plan, and still forms by far the greater portion of every telegraphic system. The frequent connexions and disconnexions with the general circuit, or with either terminus—the silencing and setting the alarum—the switch to divert the current to a branch line—were all parts of the Intermediate Telegraph; and it required a great deal of detail invention to effect the necessary changes by a simple movement of a lever or roller. Vol. i., p. 196. See Appendix B, p. 107.

In further illustration of his practical views and widely-diffused mental activity, I here mention his plan for a "Fire Telegraph," proposed in the summer of '37, by which all the Police and Fire Stations of the metropolis were to have been connected by a single circuit. In his letter to our mother, of July 2nd in that year, alluded to in LETTER ii., he writes:—"I called on Mr. Joshua Walker and imparted my plan for the Fire Telegraph; he spoke handsomely of it, but recommended my proving the practicability of the general principles before I attempted to introduce a project involving the disturbance of the pavement." Vol. ii., p. 130.

The ENTIRETY of these arrangements was my brother's.

"On the whole, then," (he asks,) "what becomes of Mr. Wheatstone's claim

to have been 'the first contriver of the Electric Telegraph in the form which made it available for popular use?' His contrivance was not the first which was available, and was never used except experimentally; nor did it become an electric telegraph at all, except by engrafting itself on my reciprocal system, and adopting my alarum, my detector, and my methods of insulating the wires. It was the single movement of the Heidelberg key—carrying with it both poles of the battery—opening the drawbridge in giving a signal, and closing it to receive a reply—producing 'consentaneously and simultaneously at opposite extremes of the line' a corresponding single-needle movement before the operator and before the recipient, on the principle of reciprocal communication—the alarum, discharged by an electro-magnet, (and later by the direct blow of a magnetic-needle, as described in my second English patent of '38, and exclusively used on the Blackwall Railway, vol. ii., pp. 165, 167,) the intermediate arrangements—the detector—the practical insulation of the conducting wires—which composed my first, as it does also the present form, of the Magnetic Needle Telegraph, 'available for popular use.'" Vol i., p. 196.

My brother's labours also produced a most valuable improvement of the galvanic battery; to which M. Moigno gives the following testimony:

"Pile à sable.—La plus simple de toutes les piles, la plus employée en Angleterre sur les lignes télégraphiques, est celle de M. Cooke. Une pile neuve montée avec soin peut fonctionner pendant six ou huit mois, si les dépêches ne sont pas trop multipliées; il en est qui ont fait un excellent service pendant plus d'une année."—*Moigno*, p. 322.

On which my brother observes;

"When I first directed my attention to the Electric Telegraph, the best battery would only remain in use for a few hours, and became rapidly weaker. I do not mention this battery as meriting any praise, but simply as a step in the "Practical Telegraph." Vol. i., p. 197, *note*.

Having thus made firm his own ground before the Arbitrators, my brother could well afford to do justice to his partner in these memorable words:—

"I most willingly acknowledge the very great value of your improvements in the telegraphic apparatus; but admitting these claims of invention to certain particular forms in a long series of improvements, through which every new invention must gradually advance to perfection,—independent of them all—I still maintain my claims on this broad basis, that alone, unaided, and unadvised, I projected, and after five years of indefatigable perseverance, amid the greatest difficulties, have now introduced into daily use my own project of a Practical Electric Telegraph, which in theory had remained for many years a plaything in the hands of scientific men, and might, but for my exclusive devotion to it from the first day that the idea occurred to me, have remained so till this day." Vol. ii. p. 196.

The Arbitrators registered my brother's "*claims on this broad basis*," and awarded that,

"William Fothergill Cooke is entitled to stand alone, as the gentleman to whom this country is indebted for having practically introduced and carried out the Electric Telegraph, as a useful undertaking of national importance;—that Professor Wheatstone is acknowledged as the scientific man whose profound and successful researches had already prepared the public to receive it as a project capable of practical application;—and that it is to the united labours of two gentlemen so well qualified for mutual assistance, that we must attribute the rapid progress which this important invention has made during the five years since they have been associated."

My brother has never asked more than this. Nor has he ever either endeavoured, or wished, to dissociate Professor Wheatstone's name from the scientific honors, which he considers that the Arbitrators justly awarded to him.

(To be continued.)

I am, Sir, &c.,

The Chesnuts, Guildford.

T. FOTHERGILL COOKE.

LETTER VI.

THE MECHANICAL OR CLOCK-WORK TELEGRAPH.

SIR,

My last letters were devoted to my brother's Two-Needle Telegraph—emphatically the Telegraph of Great Britain—with all its essential adjuncts included in his “Reciprocal System,” in contrast with Mr. Wheatstone's “Hatchment Dial and Key-board,” which also depended for practical usefulness on that “System.”

I will now say a few words on the Mechanical or Clock-work form of the Telegraph, which I have kept intentionally distinct.

This form has been extensively used in America, in the improved varieties of Printing and other Telegraphs; but it has never, till very lately, been adopted in England.

The principle of the Clock-work form of the Electric Telegraph was original with my brother. Mr. Cromwell F. Varley, the well-known electrician, in a letter, which appeared in the *Dublin Express*, and many other public journals in November last, states as an admitted fact that—

“It was Mr. Cooke, who first applied the attraction produced by voltaic electricity to the descent of a clock-train, to control its motion, or to ring a bell—an important step in practical telegraphy.” APPENDIX, p. 70.

The following extract is taken from my brother's Reply of 1856.

“The principle of my Mechanical Instrument was thus stated in my Case before the Arbitrators :—

“ ‘The principle of removing a detent by magnetic attraction, and replacing it by mechanical reaction, was not confined to the Alarum,’ (for which, as shown in a former letter, my brother had originally invented it;) ‘on the contrary, it was the basis of my Mechanical Telegraph. The first idea of it suggested itself to my mind on the 17th March, 1836, during my journey from Heidelberg to Frankfort. The striking advantage held out by the mechanical form was this, that if the electric agency could be con-

lined to the office of causing suitable interruptions or divisions in any kind of motion derived from an independent source, the diversity of the signals would depend upon the mechanism.'

"This result was to be accomplished by means of an electro-magnet; and it was my inability to make the electro-magnet act at long distances, which first led me to Mr. Wheatstone. This scientific difficulty not having been overcome when the specifications of the earlier patents were under discussion, Mr. Farey advised a postponement of the Mechanical Telegraph. The origin of the investigation of this difficulty was thus stated in my Case in the arbitration:—

" 'While my four simpler mechanical instruments were being made, I adjusted above a mile of wire in Chambers in Lincoln's Inn; but the magnets and battery being ill-proportioned, my experiments were unsatisfactory. In this scientific difficulty I sought the assistance of Dr. Faraday, who advised me to increase the number of the plates of the battery proportionably to the length of the wires; an expedient which in some degree overcame the defects of the magnets.

" 'Dr. Roget informed me that Professor Wheatstone had a quantity of wire at King's College, and advised me to submit my difficulty to him. I accordingly called the same day upon Professor Wheatstone at his residence in Conduit-street. On many occasions during the months of March and April, 1837, we tried experiments together upon the electro-magnet; our object being to make it act efficiently at long distances, in its office of removing the detent. Failing to attain this object, we adopted the expedient of a secondary circuit, which was used for some time in connexion with my Alarum,' (and more recently for distant telegraphing.)

"Mr. Wheatstone's subsequent application of the theory of Ohm rendered the electro-magnet available for the long distances required." Vol. i., pp. 198—200.

When the battery was increased in intensity at the recommendation of Faraday, these mechanical instruments worked efficiently through the few miles of wire required for the tunnel service, for which they were immediately designed. And they were at work at Euston Square, together with my brother's second Magnetic Needle Telegraph, (Part H of Drawings, vol. ii.,) before Professor Wheatstone's Hatchment Dial was either made or invented. Indeed my brother's Mechanical Telegraph, and second Magnetic-Needle Telegraph, above mentioned, were the only instruments shown in the first instance to the Directors of the London and Birmingham Railway, and to Mr. Robert Stephenson, as the embodiments of the new invention, by which those gentlemen were induced to enter upon the immediate trial of it with so much ardour and alacrity. The facts are thus stated in the arbitration evidence:—

"Mr. Cooke's second Galvanometer Telegraph, a correct history and description of which are contained in his Case and drawings, was made to be shown

to the Solicitor General with Mr. Cooke's mechanical instruments, as the complete practical instruments, for which the patent was to be obtained; and so far from its having been made after Professor Wheatstone had a complete telegraph, it was shown to the Solicitor General as a complete practical working telegraph, in May, 1837, together with a pasteboard model of Professor Wheatstone's diagram,* hastily made by Mr. Cooke for the purpose, very soon after Mr. Wheatstone invented it. Moreover, Mr. Cooke's second Galvanometer Telegraph and his mechanical instruments were at work alone at the London and Birmingham Railway before Professor Wheatstone had even a model instrument to add to them." Vol. ii., pp. 168—9.

It has been already mentioned that, while the electro-magnet remained in an imperfect state, the specifications of the Mechanical Telegraph were postponed by the advice of Mr. Farey, a gentleman eminent in Patent questions, as well as in engineering. Accordingly that form of the Electric Telegraph was not secured by patent until 1840, when Mr. Wheatstone had succeeded in perfecting the voltaic-magnet.

Although the mechanical forms of the Electric Telegraph were very beautiful and varied in their arrangements, and contained a great deal of invention of great ingenuity, and promised at the time an extended application, nevertheless the patent of 1840 expired without the inventions secured by it coming into practical use;—excepting only, that the electro-magnet, which, as perfected by Mr. Wheatstone, had become very valuable, was universally employed for my brother's Alarum, as well as for that "Relay Circuit," which Mr. Wheatstone calls "the one joint invention" of the copatentees.

And here I think it is desirable to summarize what has been said of these two forms of the Practical Electric Telegraph,—viz., of the Magnetic-Needle Telegraph of Great Britain, and of the Mechanical Telegraph—both which forms of the Electric Telegraph were devised by my brother, in all their essentials, within a month of his first initial start at the Heidelberg lecture-room, (while he was yet ignorant of the researches of Professor Wheatstone;) and which, as improved far onwards towards perfection, were secured—the former in the joint-patent of 1837, and in my brother's patent of 1838,—the latter in the joint-patent of 1840.

In my last two letters I confined myself for distinctness' sake to my brother's Magnetic-Needle Telegraph, originally invented at Heidelberg, with its various practical adjuncts, viz., his Alarum, his Detector, his Portable Telegraph, his Intermediate Telegraph, his original employment of the Earth, as half the circuit, and his methods

* "Then horizontal; the vertical needle being a later idea." Vol. i., p. 191, *note*.

for the Insulation of the Wires: I confined myself to that form of Telegraph in its perfected state, as improved by Mr. Wheatstone's dry-battery contacts and vertical (instead of horizontal) needles, and by my brother's own "return wire," and self-acting draw-bridge, adopted from his earliest Mechanical Telegraph. Of that perfected form, as the Magnetic-Needle Telegraph of Great Britain, five thousand eight hundred and eighteen Instruments are in use at this moment by the Electric and International Telegraph Company alone.—Report, January, 1867.* I compared that perfected Heidelberg Telegraph with the perfected form of Mr. Wheatstone's "Hatchment Dial and Key-board," of which the Key-board alone was in existence, when Mr. Wheatstone became acquainted with my brother, in February, 1837; the Hatchment Dial not having been invented by him till after the application for the first patent in the following May. With respect to this perfected Hatchment Dial with Key-board, I pointed out that it has never come into practical use;—that it is now to be seen at King's College, in the only two specimens ever constructed,† and nowhere else; that its principle, the combined movement of converging needles, could not compete with the simplicity of my brother's single-needle movements; that, whatever the beauty of its symmetrical form, it was dependent for any practical usefulness, upon that reciprocal principle, (my brother's,) upon which it was engrafted, and upon those various practical adjuncts, above mentioned (my brother's,) with which it could not dispense;—I also showed that, the superintendence of the specification of the patent for the joint inventions having been entrusted to Professor Wheatstone, he contrived to have only his own share of them represented, viz., this Hatchment Dial and Key-board; and that it was only at the last moment that my brother's energetic remonstrances induced Mr. Farey to introduce his single-needle system into the drawing of the Dial, notwithstanding Mr. Wheatstone's lament over its damaged symmetry‡;—

* The Report mentions 6491 Instruments. Of these, however, 663, for printing and other purposes, are of a different construction. It is scarcely necessary to add that none of these 663 are Mr. Wheatstone's.

† I will here mention, that both the "Hatchment Dial" instruments were made entirely under my brother's direction; one by Messrs. Moore, the well-known clock makers of Clerkenwell, the other, by a mechanician named Kirby. Mr. Wheatstone, I believe, never saw them, till they were produced complete at Euston Square. Since the text was in type it has been brought to my knowledge that besides these two specimens of the Hatchment Dial, two working models of the same were afterwards made for the trial in Guildhall, mentioned in a following note. Those models have since remained, *for show only*, in the Board-room of the Electric Telegraph Company.

‡ Mr. Wheatstone somewhat pettishly refuses my brother all hope of historic fame for his Needle Telegraph with simple signals:—"The modifications, which you introduced, *without consulting me*, I consider as altering the simplicity and elegance of the arrangements, without introducing the slightest

that this egotism of Professor Wheatstone endangered the patent; and that it was only my brother's "reciprocal system," (which was proved in court* to be a "new principle,") and his "single-needle movement," so forced into the specification at the last, which saved the patent;—and that "The chief ground of the defence was the fact that the Telegraph in the form specified—the Hatchment Dial and Permutating Key-board—*had never been used.*"

In my present letter my brother's mechanical form of Telegraph has been briefly introduced. Of this we have seen that the scheme of it was formed within a month of his first sight of an electro-telegraphic experiment at Heidelberg, whence he proceeded to England to perfect this instrument more especially;—that its valuable elementary principle, defined by Mr. Varley, was an original contribution of my brother to Electric Telegraphy;—that that principle first appeared in his *Alarum*, invented within that first month for his Needle Telegraph;—that an already improved form of this Mechanical Telegraph was presented, together with his second Needle Telegraph, to the Directors of the London and Birmingham Railway, as the only Instruments representative of the new invention, Professor Wheatstone having at that time nothing to add to them;—that the same two, my brother's instruments, were at work in the experiments at Euston Square, before Professor Wheatstone had even a model of his Hatchment Dial to produce; and that when the same two (my brother's instruments,) were about to be presented to the Solicitor General, still as the only representatives of the new invention, my brother hastily made with his own hands a pasteboard model of Professor Wheatstone's newly-invented Dial, (then horizontal,) that justice might be done to the contribution of his colleague.

On review of this summary I say—Compare what the parties have done;—Compare the spirit which they have shown;—Compare the practical result of their labours, as tested by practical adoption. I also say, Compare with this summary the words of Professor Wheatstone, in his "Answer," vol. i., pp. 55 and 51, that this Hatchment Dial with Key-board—

"Is the instrument on which he relies for a refutation of Mr. Cooke's claim,"

advantage, and I certainly should not recognise them in any published description." Wheatstone's Answer, Vol. i., p. 114. It may be some consolation to my brother that the Professor *had recognised* them, by his signature, in the English, Irish, and American, specifications; and that all England recognises them at this moment in the 5818 instruments in use on the lines of The Electric Telegraph Company alone.

* The Electric Telegraph Company v. Brett and Little, tried at Guildhall on the 21st, 22nd, 23rd and 25th of February, 1850, before Lord Chief Justice Wilde and a special jury. Vol. i., p. 172.

and for the "sustaining of that position, which he has always claimed for himself, and which cannot be better stated than in the words of the Quarterly Review."

The position, which he claimed for himself anonymously in the Quarterly Review—(let it be borne in mind that the article in that Review was "prompted exclusively" by Professor Wheatstone himself,)—the position which more recently was claimed for him, (whether prompted, or unprompted, again anonymously,) in the leading articles of The Times in October last—being unquestionably *the position of the sole meritorious candidate for that honour, which the Public may be pleased to confer for the successful establishment of an institution, conspicuous among the many great institutions of these modern times—THE PRACTICAL ELECTRIC TELEGRAPH OF THIS COUNTRY.*

But whatever inferences may be drawn from the foregoing summary as to the relative claims of the two parties in respect to inventive contributions, independent of them all there remains my brother's great and unimpeachable claim as the one energetic, indefatigable, indomitable, successful originator and realizer of the great practical fact. It was on this ground that my brother laid his chief stress from the beginning.—It was on this ground that the first arbitration, in November, 1837, under Sir Benjamin Hawes,* vested in my brother "The exclusive management—the exclusive engineering—all the benefits of laying down the wires—all the benefits of the manufacture of the instruments." Mr. Wilson, in his Address to the Arbitrators in 1841, opens at once on this broad basis of my brother's claims; and on the Award of Sir Benjamin Hawes in confirmation of it; and with this all his other facts are interwoven.

The "Spectator," in a carefully-balanced article of January 19th, makes no inconsiderable approach to accuracy in representing my brother as "the practical projector," Mr. Wheatstone as "the scientific coadjutor," "in the great work of the introduction of the Electric Telegraph into Europe." Nothing can be more forcible than the writer's illustration of my brother's pre-eminence by that of George Stephenson:—

"Why are the names of the pioneers of railway locomotion consigned to the background of the history of applied mechanical science, and why does George Stephenson's ultimate practical embodiment of the previous results

* This arbitration before Sir Benjamin Hawes, K.C.B., in November, 1837, was found necessary by my brother, *in order to enforce* "the terms of partnership" as originally agreed to in the preceding May. The result is thus recorded by the Award of 1841:—"The terms of their partnership, which were more exactly defined and confirmed in November, 1837, by a partnership deed, vested in Mr. Cooke, as the originator of the undertaking, the exclusive management," &c. Award, p. xxviii.

of the inventive faculty of other men, who had probably more of that faculty than himself, bear off all the honours of the invention of steam locomotion from all his precursors and all his competitors in that long-laboured field? Simply because George Stephenson was the first to work out the problem of steam locomotion to successful practical purpose, and raise it from a toy or hobby to a thing of use. It was in the power of persevering development and practical adaptation that he excelled all his clever precursors and competitors; and it was the accomplished result, not the original conception of that result as attainable, nor even the exhibition of the first specimens of its partial attainment, which identified his name for all future time with the honour of that invention."

Nothing can be more exact than the same writer's discrimination in the following sentence:—

"We must suppose Professor Wheatstone's skilled scientific co-operation to have been highly important to the speedy successful carrying out of the practical enterprise first started in that shape by Mr. Cooke, but we cannot suppose the 'energetic nature and shaping mind' of the latter to have had less of motive force in the detailed conduct of the enterprise, than they undoubtedly had in the first determined pursuit of it as a practical enterprise at all." APPENDIX, Extract, p. 93. "SPECTATOR."

My brother's pre-eminence as the originating, organising, effectuating, author of the great practical result, receives many effective illustrations in letters which have appeared in various Publications since October last. From these I make the following extracts.

In the number of the Reader for November 3rd, a correspondent, signing himself R. A., remarks:—

"No one can read the volume, (containing the pamphlets of '54 and '56), without noticing in every page that the contested point was *the honour of having originated and carried out the Electric Telegraph as a useful undertaking*, and this was the point settled by the Award." APPENDIX, p. 60.

Again, in the Dublin Express for November 21st, Mr. Cromwell F. Varley, amidst many apposite passages, supplies us with the following:—

"No one will, I hope, for a moment doubt that Professor Wheatstone was a most active and useful scientific adviser to, and co-operator with, Mr. Cooke, and that a very great amount of credit is due to him; but when we consider the question as to whom Europe is indebted for the introduction of the telegraph as a great commercial undertaking, then the credit must undoubtedly belong to Mr. W. F. Cooke; for, had he not happily been introduced to Professor Wheatstone, his energy and enthusiasm were such, that the telegraph would still have been a *fait accompli*,

though probably not perfected so soon, for he would have sought other scientific aid to help him to combat the difficulties which presented themselves." And again :—

"While philosophers, so to speak, were playing with the telegraph and exhibiting it as a "possibility," Mr. Cooke grasped the electric toy, and converted it into one of the subtlest and most valuable agents, which the world has ever beheld."

From the Reader for December 1st, I extract, as follows, from an excellent letter by W. J. P. :—

"One of the group, (dispersing from the Heidelberg lecture-room,) went his way full of thought. The grand possibility of a universal Electric Telegraph had flashed upon his imagination. For four days and as many nights his excited mind meditated over its realization. On the narrow ground of what he had seen in Müncke's lecture-room, he had raised his superstructure. From the hour of conceiving his great work Mr. Cooke threw the whole of his indomitable energy to the accomplishment of it. The inventions were but the first part of his work."

Here I turn once more to Mr. Varley's letter.

"Thanks to Mr. Cooke's enthusiasm and energy, the Electric Telegraph took root, and spread over the length and breadth of the land. It was William Fothergill Cooke who went out on railway lines to combat the mechanical and other difficulties inseparable from all new works ; he, who carried out the negotiations with the railway companies for the erection of the telegraphs on their lines ; and it was he who proved to Robert Stephenson, Mr. Ricardo, and those gentlemen who formed the nucleus of the Electric Telegraph Company, that the Electric Telegraph was no chimera, but a really *sound, practical, commercial* undertaking." And again ;—

"Many philosophers have invented electric telegraphs ; many had foreseen their great use ; but the one man of indomitable energy, perseverance, and foresight, who took the matter up, and forced the public into its recognition, is undoubtedly William Fothergill Cooke." APPENDIX, Ext. xiv., p. 69.

I take one more extract from W. J. P. :—

"The ultimate success of the electric telegraph is well known to the public ; but the public does not know how much its success has been the work of this one man." APPENDIX, Extract xxi., p. 76.

In the Reader for December 22nd, "Matter-of-fact," in a powerful and graphic letter, handles our subject to good purpose :—

"I am about to contrast with his scientific predecessors this Watt, Arkwright, or Stephenson, of telegraphy, who did not look to the patronage of Government for assistance, but fought his own way through all difficulties

to success. It is in this respect that Mr. Cooke stands out in such strong relief from the honourable band of telegraphic projectors that preceded him. He seized his idea where many hundreds of others might, if they could, have done the same, at a public lecture-room. He sticks to it, never leaves it, works at it day and night in all its bearings, seeks scientific aid, obtains the protection of a patent, finds among the Stephensons, Brunels, and men of that class, minds that listen to his earnest representations and strong conviction, that the electric telegraph was a pressing necessity and a practicable reality. I was present at a Board Meeting of the Great Western Directors, and heard him urge upon those sceptical gentlemen that, with a telegraph over their railway, the Manager, in his office at Paddington, would, 'like a spider, live along the line.' The younger Brunel applauded, whilst others laughed at his quotation and his enthusiasm. But he carried his point."

"Matter-of-fact" goes on to show how, in 1841, my brother, by a pamphlet on the application of the electric telegraph to single lines of railway, entitled *TELEGRAPHIC RAILWAYS; OR THE SINGLE WAY*; (London, 1842;) not only obtained an effectual starting point for the telegraph, but also helped in raising the railway system of this country from its then state of depression.—

"George Stephenson and George Bidder adopted the plan. They obtained Acts for the Yarmouth and Norwich, the Brandon, the Northampton and Peterborough, and the Chester and Holyhead lines, (all single lines under the then Acts,) to be worked by the aid of the telegraph. Railways revived, the Admiralty was roused, the late Lord Herbert, and other members of the Admiralty, visited Mr. Cooke at the Society of Arts, where all the instruments about to be fixed on the Yarmouth and Norwich lines were exhibited to them at work.

"From that time the Electric Telegraph went alone. His hair should be getting grey now, but he seems to be under the influence of his youthful energy in his fight for his rights against long-established prejudice."

"Matter-of-fact" concludes;—

"In Mr. Cooke's letter, in a recent number of the Reader, he modestly ascribes his success to having taken the "tide at its flood;" but I think I dare assert that the strong conviction of future success which settled down upon his mind on that memorable evening at Heidelberg, and which seems never for a moment to have deserted him through a struggle of several years, would, had it occurred in 1816 instead of 1836, have enabled him to master all difficulties. He would, as in his own time, have imparted his strong convictions to other sympathising minds, and, unaided by railways, have carried along the high roads an electric telegraph to the leading commercial cities of the kingdom." APPENDIX, Extract xxiv., p. 82.

The practical value, for the first twenty-five years, of Wheatstone's Hatchment Dial and Mechanical Instrument has been—NIL. Only the Vertical Needle, adopted by him in '37; and the Voltaic Magnet, improved by him in '40; have come into general use. *Had the Telegraph depended upon him, WHERE WOULD IT HAVE BEEN?*

When, in my brother's completed system, the Telegraph had been realized, Wheatstone showed to many eminent men of Europe and America his unused Instruments, and announced himself at King's College, in home and foreign publications without number, and in the "Quarterly Review," as—THE MAN WHO HAD DONE ALL. *This MAN WHO HAD DONE ALL—having, under the eyes of the Arbitrators, attested by his signature that WILLIAM FOTHERGILL COOKE, (the partner whom for a period of thirty years he has systematically ignored and supplanted,) was the "ORIGINATOR" of the PRACTICAL TELEGRAPH, and "ENTITLED TO STAND ALONE, &c."*—Thus he manufactured for himself—"HIS WELL-KNOWN NAME."

The "TWO-NEEDLE TELEGRAPH," the "ALARM," the "RECIPROCAL COMMUNICATOR," the first "PERMANENT BATTERY," the "SUSPENDED WIRES,"—all, in fact, which realized the TELEGRAPH, *was my brother's original work—his work alone.* These successes, *his heavy pecuniary risks*, his unshaken confidence in the result, his undaunted perseverance in the years of difficulty and disappointment—these things established the practical value of the Institution, which the TELEGRAPH COMPANY took over in '45 with the support of a MILLION OF CAPITAL.

By these arduous and successful labours a large fortune was made for WHEATSTONE, without risk or trouble to himself. When he had made an apparently practical application of his improved magnet to a Mechanical Instrument, *on my brother's Original Principle*, (see Varley, p. 35,)—and had obtained from my brother, *before showing him the Instrument*, the concession of exclusive rights *on the faith of its originality*—and had secured those rights in England, and on the Continent,—*he never could turn them to account—HE HAD NOT MY BROTHER'S AID.*

"Assuming that Wheatstone earned his £33,219, in cash,—*Was he the Author of the Practical Electric Telegraph?* THE AWARD SAYS—NO!" (Vol. i., p. 48.)

(To be continued).

I am, Sir, &c.,

The Chesnuts, Guildford.

T. FOTHERGILL COOKE.

LETTER VII.

ABUSE OF INFLUENCE WITH THE PRESS.

SIR,

Before closing my series of Extracts from those genuine and authentic documents, to which I have constantly referred, and by which I have undertaken to vindicate my brother's rights, as sealed by the Award, from the general and persistent usurpations of Professor Wheatstone, it only remains for me to show, in this last letter, that those usurpations have been effected under cover of documentary evidence of a very different character.

From the first commencement of Professor Wheatstone's acquaintance with my brother, the former has been found arming himself from time to time with such documents. The manner in which he has obtained them has never been creditable; in some instances it has been discreditable in the extreme. Of the documents thus obtained he has too often availed himself by clandestine use, whilst assuring my brother, through his solicitor, of "his unqualified submission to the Award."

I have already fixed upon him the frequent abuse of "the Editor's note in the Magazine," by misrepresenting its date, as having been "prior to his knowledge of my brother's existence;" an abuse twice repeated after the Award of the Arbitrators in 1841, accepted by himself, had condemned it, as wrong. I have also shown that the contents of that "note," so far as they were material to his purpose, were untrue; and that grave suspicions attended the insertion of that "Editor's note" in the Magazine of Popular Science on the morrow of my brother's "introductory visit." Here, then, in the outset, we have a first and memorable instance of this discreditable practice.*

A few months after this,—while my brother was occupied with his experiments at Euston Square,—we find Professor Wheatstone arming himself with a second

* If we strike from the "Editor's note" its only material part, viz., the imaginary "thirty-signal apparatus," (see LETTER II., p. 7,) there remains nothing very remarkable in this publication of Mr. Wheatstone's ideas of Electricity as applicable to Telegraphic purposes, except the long interval of

document for future use. My brother thus alludes to the circumstance in terms justly sarcastic:—

“Our future judge, Professor Daniell, has come back to King’s College from a treat which his friend Professor Wheatstone has given him at Euston Square. The two King’s College Professors will meet half-a-dozen times the next day. But Professor Daniell ‘cannot refrain from expressing,’ instantly in writing to Professor Wheatstone, ‘the pleasure he has felt at witnessing the complete success of *his* Electro-Magnetic Telegraph.’ From the room adjoining Professor Wheatstone’s, Professor Daniell writes this letter. He is ‘quite surprised at, and almost at a loss to account for, the different effect produced upon his mind by *believing* and *seeing*.’ Although he has ‘followed all Mr. Wheatstone’s experiments from the beginning, and is intimately acquainted with both the principle and construction of his apparatus,’ Professor Daniell has been ‘struck as with something quite new.’ He is now satisfied that the telegraph must be ‘adopted upon all railroads immediately, as well as upon an extensive scale for private communications.’ Vol. i., pp. 158—9. See Mr. Daniell’s letter *in extenso*. Vol. i., p. 59.

My readers will judge for themselves whether this letter simply resulted from Professor Daniell’s inability to “refrain,”—or from some suggestive hint from Professor Wheatstone! In it the Electro-Magnetic Telegraph is described by Professor Wheatstone’s intimate friend, as “*his*,” *Mr. Wheatstone’s*, Telegraph, ignoring the existence

eight months which separated it from the lectures, to which it called attention, and its very close sequence upon the “introductory visit.”

We know, on the authority of Mr. Wheatstone himself, that he thereby only added himself as one unit more to sixty-two scientific men who had already done the same. And his friend, M. Moigno, in introducing his remark, informs us that there is scarcely a scientific man to whom the same idea has not occurred; and that these scientific men have generally yielded to the desire of giving publicity to their impressions.

“Remarquons d’abord qu’il n’est guère de physicien à qui l’idée ne se soit présentée d’employer l’électricité comme moyen télégraphique, et que le plus grand nombre de ces physiciens ont cédé au désir de donner de la publicité à leurs procédés. M. Wheatstone disait en 1838 à M. Quetelet qu’il avait déjà recueilli pour sa part les noms de soixante-deux prétendants à la découverte.”—*Moigno*, p. 75. Vol. I., p. 154, *note*.

When “the right man came” to grasp that—“*idée télégraphique*”—the “Scientific Toy of the Philosophers”—how different was the course pursued!

When a great array of unsupported “statements, boldly and positively, and sometimes most circumstantially advanced,” with “most serious charges built thereon,” (Vol. II., p. 134,) was brought against my brother’s Substantive Claims—when alleged *private* conversations and the aid of *memory* were invoked against them—Facts and Witnesses, Instruments and Drawings, Plans and Documents, sustained the Claims. The aid of “Puffs in Magazines” would have been sought in vain.

I take this opportunity of stating that it was ascertained, by careful enquiry at the time of the Arbitration, that the Magazine of Popular Science rarely appeared earlier than the 4th or 5th day of the month; notwithstanding that Mr. Wheatstone, in his note in the Quarterly Review in 1854, has been precise in associating the Number for March, 1837, with the *first* day of that month in that year.

of a partner. The source from which *that* impression had been derived—an impression so widely differing from the *deliberate judgment*, officially delivered three years later by this same Professor Daniell, in his Award,—was unquestionably Professor Wheatstone himself.

I make one further remark on this letter, as showing the *initial impressions*, with which Professor Daniell had been *imbued*; viz., that there can be no stronger confirmation of the reliability of the Award in all the concessions made by it to my brother, or of the cogency of the evidence by which those concessions were induced, than this revised—this reversed—judgment of an Arbitrator so friendly to my brother's opponent, so strongly prepossessed, and even pledged, in his favour.

We soon find Professor Wheatstone arming himself with a third document, and from the same quarter as the preceding.

“Some six years later, viz., two years after the Award, Professor Daniell writes another letter. Professor Wheatstone, his intimate friend, has applied to him ‘*ex parte*,’ by a private letter, complaining that ‘Mr. Cooke had obtained more than his own share of credit, and especially from’ the Award!—complaining that immediately after the Award appeared, Mr. Cooke circulated it extensively, without any allusion to a certain ‘*memorandum*,’ (presently to be noticed,)—complaining also that Mr. Wilson, Mr. Cooke’s solicitor, in a letter to a private friend, maintained *as a thing known to himself of his own personal knowledge as a fact*, that Mr. Cooke was in the right and Mr. Wheatstone was in the wrong; and that the signing of the Award, coupled with the fact of the expenses of the arbitration, ‘Mr. Cooke’s amounting to several hundred pounds,’ being paid out of the proceeds of the invention, proved that this was the case.” Vol. i., pp. 159, 165, and 163.

It is beside my present purpose to notice the futility of the pretexts on which this private letter, intended to neutralize the Award, was alleged to have been procured; that the Award, circulated by my brother, declares itself “a document, which either party may at pleasure make publicly known;”—that the memorandum contained no such provision, and was evidently not a subject for publication. It is beside my purpose to ask, Why, instead of complaining of my brother for circulating a document, which the Professor had accepted with grateful cordiality as “a statement of facts,” he did not rather circulate it himself? It is also beside my purpose to remark, that Professor Daniell’s answer to his letter is an incautious document; that it *purports* to be written from recollection only;—that it contains certain palpable errors;—that it denies neither Mr. Wilson’s assertion, that “he knew of his own personal knowledge as a fact that Mr. Cooke was in the right, and Mr. Wheatstone was in the

wrong," nor that Mr. Wheatstone was condemned to bear half the expenses of the arbitration.

What I call serious attention to is, that Professor Wheatstone, being dissatisfied with the judicial Award of Sir I. Brunel and Professor Daniell, which he professed to have gratefully accepted, sought by private letter a private interpretation of that Award from Professor Daniell, as his private friend ;—that the very existence of the private interpretation, thus illegally obtained, was kept a profound secret from my brother, whom it was intended to injure, during two years, viz., from the time that it was obtained, in 1843, till an incautious allusion to it in 1845 excited suspicion, and Mr. Wheatstone found himself compelled by my brother's challenge to publish it in 1856 ;—and that it was unscrupulously used behind his back during that interval both in this country and on the Continent.

Most reasonably does my brother ask, "Was Mr. Wheatstone justified in using this behind my back, as a judicial interpretation of the Award?" Most justly does he comment upon the proceeding in these severe terms :—

"Though it must be a subject of regret to Mr. Daniell's friends that his letter should have been brought forward in this controversy, I need not impute to a man, so deservedly respected, more than a great degree of indiscretion, in trusting to another person a testimonial, liable to be, as it has been, abused to purposes deserving of more severe reprehension. Its object and character were well described by anticipation, as follows :—

" 'Ignorant though we be of the nature of this singular document, we have no difficulty, if it was written by Professor Daniell, in predicting its contents. Its object, doubtless, was to sweeten the bitter pill of the Award. It was an opiate tenderly administered to disappointed vanity,—a curb, perchance, to that morbid appetite for fame, which respects neither individual rights nor social feeling.' (North British Review, January, 1855, p. 577.)

"For Professor Wheatstone himself I can admit no excuse. I charge him, on his own confession, with having induced our judge to write an unguarded private letter, in order that he might make use of it clandestinely to falsify the legal Award. I do not believe that the 'Scientific World,' by whom he claims to be judged, will tolerate such conduct ; but I cannot admit that the subject is one 'adapted for their special cognizance.' " Vol. i, p. 169.

I cannot quit this subject without remarking, that as Professor Wheatstone has given us no clue to the "suggestions" on his own part, to which Professor Daniell's former letter was a response ;—so on the present occasion also he has given us none, beyond the puerile complaint, that my brother "had obtained too much credit from the Award." The proved liability of Professor Wheatstone to extreme inaccuracy causes this omission to touch the whole matter to the quick. Suppose him to have

been on the one hand as circumstantial, and on the other *as wide of any correspondence with facts*, as in his very circumstantial account of the "cross-Thames experiment with the insulating rope," which in a deliberately-written Case he had laid before the Arbitrators, and we find a simple explanation of such emotion on Professor Daniell's part as would best excuse his "unguarded letter" drawn from "hasty recollections." (Pages 7 and 8, *supra*.)

In the first memorable instance above alluded to of deceptive documentary evidence discredibly obtained, Professor Wheatstone appeared as the virtual, if not the actual, author of the document in question. In the two following instances I have found him procuring the writing of such documents, while concealing from us the means which he employed to obtain them, and the use, which he made of them, when obtained. In the instance which I am about to notice, the document, inoffensive in itself and of no consideration, was ready to his hand: it is the "memorandum" before alluded to, and runs thus:—

"At the Meeting held at King's College, on the 27th April, 1841—For the purpose of settling Messrs. Cooke and Wheatstone's arbitration, it was this day agreed between the parties, with the sanction of the Arbitrators:—

1. That Mr. Wheatstone's separate privileges be confirmed, &c.
2. That the printed papers be placed at the disposal of the Arbitrators, &c.
3. That the expenses of both parties in this arbitration be partnership expenses, &c." Vol. i., p. 160, *note*.

It is on the 1st of these three items that Mr. Wheatstone essays to build his fragile edifice, and to it we will attend. But as he attempts to represent the 2nd and 3rd items as favourable to him, a few words will first dispose of that hallucination. As to the 3rd item, it is difficult to reconcile Mr. Wheatstone's implication, that "the expenses of both parties being partnership expenses, *i.e.*, paid by both parties in equal shares, is in his favour, with his admission that his own expenses had been "trifling, while my brother's amounted to many hundred pounds." However, the facts are stated plainly enough at p. 209, vol. i., where we find that, Mr. Wheatstone having opposed the liberal proposition of my brother, as successful plaintiff, to make the arbitration costs partnership expenses, instead of throwing them wholly on the discomfited defendant, and the question having been referred to the Arbitrators,—my brother's proposition *was by them confirmed*. As to the 2nd item, I ask, whose shame was intended to be covered by the Arbitrators, when they consigned my brother's 1,000 printed copies of the arbitration-evidence to the furnace at the Thames-tunnel?

If Mr. Wheatstone thinks there is any doubt about the answer, I further ask, who reprinted that evidence in self-defence in 1856? and who has thenceforth appealed to it, as "a Phoenix, risen from the ashes of those flames, in which the mass of the first impression was *burnt* in 1841, TO PREVENT PUBLICITY?" PREFACE, p. viii., *note*.

Having cleared the ground thus far, we return to the 1st item of the memorandum, which Mr. Wheatstone, with a ludicrous assumption of triumph, ill-sustained by taunts and sarcasms, represents as

"Substantially the Award of the Arbitrators—the substantial subject of the arbitration—the point of primary importance, which was already gained, (*i.e.*, before the Award was signed,)—the main practical conclusion, which Mr. Cooke, abstaining from all reference to the document, which contains it, quietly, but avisedly, omits from his statement—and which may properly be called the substance of the Award, which Mr. Cooke does not venture to face, while he is pursuing its shadow." Vol. i., pp. 75, 77, and 79.

If it were anything less than ridiculous to attempt to prove that the Arbitrators' Award was no other document than that signed by them, as "a statement of facts," and cordially accepted as such by Professor Wheatstone, and published widely for the last twenty-five years—that Award of which Professor Wheatstone complained to Professor Daniell, because it gave my brother "*more than his share of credit*"—a few words from a letter addressed by Mr. Wilson to Sir I. Brunel, on the 1st of May, 1841, would set the matter at rest by identifying the Award. He writes, "I hand you some printed copies of the Award." Are we to suppose that Mr. Wilson attempted to palm off upon one of the Arbitrators the "shadow" of his own Award, instead of its "substance"—and that within four days after it was given? To this is Professor Wheatstone reduced!

But the condemnatory answer to this *ill-timed nonsense* about "Shadow" and "Substance" is, 1st, The memorandum itself; "It was this day **AGREED BETWEEN THE PARTIES**, with the sanction of the Arbitrators, that Mr. Wheatstone's privileges be confirmed." 2ndly. The Arbitration Deed, set out at length in vol. ii., which states *at the instance of my brother, when appealing to arbitration,—*

"That *the claim* to the separate rights or privileges *is not denied or disputed, but fully acknowledged*; but that the granting or securing such separate rights be postponed and reserved until the relative positions of the parties as to *Origination* and *Invention*, the ground of the appeal, should in *the first place*, by arbitration or otherwise, be ascertained and **PUBLICLY NOTIFIED.**" Vol. ii., p. 2.

The Award being signed, and permission given to "make it publicly known," the

exclusive rights were agreed to without a word, as a matter of course. By this the Professor "gained nothing," for there was "nothing to gain." These privileges, I may mention in passing, authorised Professor Wheatstone to make his own new instruments under the patent of 1840, for his own profit, and apply them to manufactories, &c. ; but the patent never came into use, and the privileges were worthless. They also authorised him to *put his own name* upon those instruments, which the Abbé Moigno translates "que son nom figurât seul sur les appareils exclusivement inventés par lui." (See also on this subject APPENDIX B, p. 109.)

My brother quietly remarks,—

"I cannot conceive any honourable motive that could have led Mr. Wheatstone to represent this memorandum as the 'substantial subject of the arbitration.'"

Passing over the "honourable motive," he might have said that Professor Wheatstone was driven to this step in self-defence, when detected in actually making this inexcusable and gross misrepresentation to the Abbé Moigno, and others:—a trans- action referred to by "Amicus,"* in a recent number of the Reader, as "the substitution, on the Continent, of another document in place of the Award." The publication, by which the unsuspecting Abbé betrayed his friend, is thus introduced:—

"The Abbé Moigno, a devoted admirer and credulous friend of Mr. Wheatstone, seems to have been prompted by the Professor, when he gives the following description of the Award:—

"Je ne dirai que quelques mots des luttes ardentes et passionnées que M. Wheatstone a dû soutenir; luttes dont, en France, l'objet a été méconnu et le caractère défiguré.

COOKE ET WHEATSTONE.

"M. Cooke ne disputait pas à M. Wheatstone la priorité, le mérite et la gloire de son invention: la querelle n'était au fond qu'une querelle d'amour-propre trop commune entre associés; M. Cooke voulait que tous les appareils dont l'exploitation était précisément l'objet de la société constituée entre eux portassent à la fois les noms des deux associés: Wheatstone et Cooke. Le savant physicien repoussait cette prétention, parce qu'elle lui paraissait illégitime: *il voulait que son nom figurât seul sur les appareils exclusivement inventés par lui*, et n'admettait la présence des deux noms que sur les instruments fruits de recherches communes.

"Des arbitres furent nommés: parmi eux figurent des noms célèbres, ceux de Daniell et de Brunel: la paix fut rétablie entre les associés."—*Traité de Télégraphie Electrique, 2nde Edit. p. 98. Vol. i. p. 148, note.*

* APPENDIX, Extract xxvi.

Thus, through the agency of Professor Wheatstone, has this ridiculous travesty of the Brunel Award been widely spread upon the Continent, *as a corrected version*.

As fitting climax to this series of deceptive documents, discreditably obtained for discreditable uses, Mr. Wheatstone obtained admission to the "Quarterly Review," in 1854, of an article on the Electric Telegraph, "prompted exclusively" by himself, in which the Award, which he had accepted with grateful cordiality in '41, is simply ignored and inverted; in which my brother, whom he had then cordially acknowledged as "entitled to stand alone, as the gentleman to whom this country is indebted for the establishment of the practical Electric Telegraph," is represented as a "practical mechanic," with whom Mr. Wheatstone had associated himself in '37:—and the merits of Mr. Wheatstone himself are extolled, chiefly, if not solely, on those very grounds which he had, on the former occasion, cordially conceded to my brother.

In face of the high reputation of the "Quarterly Review," as one of the most powerful and respected organs of the press, not in England alone, but also in America and on the Continent, there is something staggering—there is something at which the breathing quickens—in this act. The greatness of the deception which would follow—which was sure to follow—authoritative announcement from such a quarter, suggests itself as a measure of the act of the man who planned his own aggrandisement at this cost. The greatness of the deception, which did follow, is measured by those articles of the "Times," of October, '66, in which "another name," than that announced by the Award, has been—

"Proclaimed with trumpet-tongue throughout the world—*another name alone, another name instead*—proclaimed with such secureness of foregone conclusion, that each modest testimony to truth was till lately treated as imposture, and denied a hearing." LETTER i. p. 3.

The calm, historic, statement of a witness so qualified to speak as Mr. Cromwell Varley, which has since appeared in the Dublin Express, and many other papers, is a specimen of that intervention on my brother's behalf, which the Editor of the "Times" waved back. (See his Letter *in extenso*, APPENDIX, Extract xiv., p. 69.)

"Mr. Cooke," as has been said, "may take this question quietly, but his friends and his relatives are resolved to bring it to an issue—a final issue—an issue which may leave him in the quiet possession of his well-earned honors at the close of his life. Henceforth they take up his quarrel as their own." LETTER i. p. 4. See APPENDIX, p. 90.

My brother has fought a noble fight. Among the fruits of his Telegraphic Victories, he has bequeathed to the World—His original Invention of the Clock-work

Telegraph—of the Detector—of the Alarum—of the double-needle and single-needle Telegraph of Great Britain—of the Reciprocal System, including the Intermediate Instruments, by far the largest portion of that System—of the Telegraphic Switch—of his patented plan of Suspending the wires, “which has followed the Telegraph through all lands”—and of his employment, original with himself, of the Conducting power of the Earth to complete the galvanic circuit. Among the fruits of the struggle, forced on him inevitably by an ungenial colleague, *whose surest vantage ground against him has ever been found in the traces, abundant from the beginning, of his own liberality,—of his own generosity,—of his own forbearance*—among the fruits of that struggle he has bequeathed to the World—to Justice—and to Truth—the Brunel Award, entitling him TO STAND ALONE, AS THE GENTLEMAN TO WHOM THIS COUNTRY IS INDEBTED FOR HAVING PRACTICALLY INTRODUCED AND CARRIED OUT THE ELECTRIC TELEGRAPH AS A USEFUL UNDERTAKING;—his letter to Professor Wheatstone, of November last, unanswered, and therefore almost an equivalent to that Award;* his fourth edition of his pamphlet of '54;—his crushing “Reply” of '56, from which the mass of the extracts in these letters has been drawn;—and his volume of Evidence:—

“That evidence, which drove Professor Wheatstone from *the whole debated ground* when he accepted the Award in '41; and which, accompanied by my brother's ‘Reply,’ ‘silenced his guns, if it did not make him strike his colours,’ when the article of the ‘Quarterly,’ in 1854, had renewed the controversy.”

A thousand copies had been printed, for wide circulation, when, on the appearance of my brother's Case with its statement of irresistible Facts, Sir I. Brunel had warned him of “a disposition to swamp the whole enquiry.” How little my brother regretted the destruction of those means of self-assertion, destroyed on the requisition of Mr. Wheatstone's Arbitrator, which, after the signature and acceptance of the Award, seemed no longer necessary;—how little he ever dreamed that the revival of the exorbitant claims, which had been so humiliatingly silenced, would one day call for the revival of the evidence—is witnessed by this extract from Mr. Wilson's letter, of the 1st of May, 1841, to Sir Isambard Brunel,—

“The business has ended in a manner *gratifying in the highest degree to Mr. Cooke and his friends*, as the Award will place him in his true position, without interfering with that amicable intercourse which is so essential to the interests of the undertaking, and without *unnecessarily lowering Mr. Wheatstone*. We propose to make the Award known *in the least offensive manner, viz., by distributing copies of it.*” Vol. i., p. 160, *note*.

* See this unanswered letter, APPENDIX A, page 63.

How far Professor Wheatstone has worthily requited the forbearance with which he was treated, is best attested by the world-wide delusion, of which he is indisputably the author.

I cannot but regret that an extreme sentiment of etiquette should withhold from publication,—(till demanded from the proper quarter,)—my brother's evidence of the virtual authorship of the article in the "Quarterly." Meanwhile his oft-repeated assertion stands unchallenged, that "he can by written evidence in his possession prove that article to have been '*prompted exclusively*' by Professor Wheatstone;"—and, meanwhile, I can myself also solemnly avouch of my own knowledge, in face of all denial, that the document of which he speaks would, if produced, stamp on Professor Wheatstone the "exclusive prompting" of that article, by which, without hyperbole, the whole world has been deceived—so deceived as to enable Professor Wheatstone to appropriate to himself the whole honor of that great achievement, in which he once cordially acknowledged that his own part, however meritorious in itself, was wholly subordinate to my brother's.

But if he and others, who should be the first to demand my brother's proofs, now shrink from a manly duty, the day nevertheless will come when no false delicacy or reserve shall keep them from the light, if openly—or clandestinely—my brother's "awarded" rights should be again assailed.

I am, Sir, &c.,

The Cheanute, Guildford.

T. FOTHERGILL COOKE.

"THE AUTHOR OF THE ESSAY WAS PROMPTED EXCLUSIVELY BY WHEATSTONE.—(The Editor of the "Quarterly Review") THOUGHT THE CLAIMS OF FOREIGN DISCOVERERS UNDER-RATED ;—(he) STUDIED THE QUESTION, AND ENDEAVOURED TO STATE IT WITH PERFECT TRUTH ;—(but he) NEVER CONSIDERED THE QUESTION AS BETWEEN COOKE AND WHEATSTONE, FOR THE SIMPLE REASON, THAT HE DID NOT KNOW THAT THE FORMER EVER DISPUTED THE PRETENSIONS OF THE LATTER." (See PREFACE, p. xi.)

APPENDIX A.

THE ELECTRIC TELEGRAPH.

EXTRACTS FROM THE DAILY PRESS, &c.

EXTRACT, No. I.

The "Times," October, 1866.

TO THE EDITOR,*

Sir,—No one sympathizes in the successful completion of the line of telegraphic communication to America more than myself. I rejoice also in the ultimate reward of those who accomplished the important work. All hail to their honours! But how happens it that in the midst of this jubilee and triumph the philosopher who invented telegraphic communication is left in the shade?

I had the honour to be one of a small party who, many years ago, were admitted to Professor Wheatstone's laboratory, at the *London University*, to see his models and the operations he was at that time enabled to exhibit, on which occasion Mr. Wheatstone privately revealed and demonstrated his invention of telegraphic communication, and not only foretold but proved, to the amazement of all present, the wonders it would accomplish. Mr. Wheatstone had not the wealth necessary for carrying out his invention, but sold his patent to men of capital and ability. I need not dilate on the great things these gentlemen and their associates have accomplished. I may say they have astonished the world; but I cannot help thinking that in this season of jubilee and triumph the man of science and genius, who elaborated his own idea and manifested its practicability, should not be forgotten in the dispensation of honours and dignities.

I have the honour to be, Sir, your constant reader,

J. D.

* This anonymous writer, "J. D.," confusing *The London University* with *King's College*, and labouring under vague and erroneous notions about Professor Wheatstone's "sale of his patent to men of capital and ability," and *without a date or detail*, of the private *revelations* to this amazed auditory, furnished a sufficient "gossiping peg," on which the "Times," ignoring the "Brunel Award," and all proffered evidence in favour of Mr. W. Fothergill Cooke, hung the Leaders, from which the two following extracts are taken.—*Ed.*

EXTRACT No. II.

"Times' Leader," October 10th, 1866.

A correspondent *has had the courage* to express what many feel, but which they think will be set down as the old, old remonstrance against the inequality of human rewards. COLUMBUS led the way to the New World, but a humble imitator gave it his name. To-day we see this failure of justice repeated in the story of the invention which has united the two worlds in instantaneous communication and sympathy, and so made them practically one. If any name may be set at the head of the noble list in this new roll of honour, it is that of WHEATSTONE. To WHEATSTONE we really owe the fact that the whole civilized world is now brought within an instant of time. WHEATSTONE has done this. Others have reaped the harvest of riches and honour. Fortunes and titles have fallen upon them not undeservedly for one of the greatest and most beneficial achievements whereof history tells us. But their desert, high and undoubted as it is, suffers some disparagement by the fact that the most deserving man of all has worked for others, not for himself. Nobody, however, can gainsay the claim of the public to be heard on the rights of discovery.†

But discovery and invention, it will be said, are above all reward. They are not achievements, but inspirations. They are services to the human race, and to the human race, to posterity, to Heaven, or to a future world may be left the apotheosis of the fortunate discoverer. It is actually become a superstition that the inventor must not look to man for his reward. A man may easily possess genius, scientific skill, and that diviner element which seems to make him a special link between the seen and the unseen world. We may fairly ask whether it is really a miserable necessity that, in accordance with many a precedent, such men should be left unrewarded, unhonoured, and, as far as lies upon us, *even unknown*?

The Crown is the fountain of honour. Why is that fountain so often dry to real merit, while it pours its full stream on unworthy and empty heads? The office of the Crown is simply to mark and record the *best ascertainable* judgment of the people. This, however, *may be open to inquiry, and it is always a proper subject for inquiry.*‡

EXTRACT No. III.

"Times' Leader," October 17, 1866.

The actual success of the Atlantic Telegraph represented the completion of a long series of struggles and achievements in which many departments of science, energy, and enterprise may claim a share. The credit of the original idea—that is, of the invention itself—belongs to Mr. WHEATSTONE. (See Appendix C, p. 112, on Submarine Cables.)

† Yet the "Times" has uniformly refused the "claim of the public to be heard" in favour of William Fothergill Cooke, "on the rights of (this) discovery," *though always open in favour of their own protégé.*—Ed.

‡ Why, then, does the "Times" admit *no inquiry*?—Ed.

It cannot be said that either the Government or the public undervalued either the importance of the achievement or the renown which it conferred upon the nation. At a great banquet given in honour of the event, HER MAJESTY'S Ministers not only did justice to the occasion, but announced with unusual promptitude the rewards which it was in the contemplation of the QUEEN to bestow. Nor were these rewards in themselves illiberally measured, but there was this misfortune attending the distribution—that they were very partially allotted.

We have already spoken of the exclusion of the inventor himself from these acknowledgments, and we have now to speak of the merits of other participators in this marvellous achievement.

It is certain that neither the science of our engineers nor the confidence of capitalists could have accomplished the stupendous application of Mr. WHEATSTONE'S discovery without the aid of skilled seamen—we may say, in short, without the aid of officers and men of the Royal Navy.

We know perfectly well that in any other country than our own, honours, and decorations and promotions would have been lavished on men who had brought such credit upon their service and their country. For all this, there are some who have had their just reward; but there are others who deserve it no less.

EXTRACT No. IV.

"The Daily News," October 31st, 1866.

CIVIC BANQUET TO THE ATLANTIC TELEGRAPH COMPANIES.

About 150 gentlemen were invited last evening by the Lord Mayor and Lady Mayoress to a Mansion-house banquet, in honour of the companies concerned in the Atlantic Telegraph scheme. Alderman COPELAND presided.

The guests included Lord Cranborne, M.P., Hon. Robert Grimston, chairman of the Electric Telegraph Company; Right Hon. John Stuart Wortley; Mr. Charles E. Stewart (chairman), and the directors of the Anglo-American Telegraphic Company, &c. . . .

The CHAIRMAN, in giving the toast of "Science as applied to telegraphy," narrated that some thirty years ago he was at King's College, when Professor Wheatstone exhibited the experiments that had led to the gigantic undertaking now a completed fact. The idea at the time attracted much interest, and many of the most eminent men of the day came to see the experiments and hear them explained, although probably there were but few there who dreamt of the untold service to mankind that would be rendered after the lapse of time.† (Cheers.) The names of Professors Wheatstone and Thompson were coupled to the toast.

The CHAIRMAN gave the toast of the evening—"Prosperity to the Atlantic Cable."

† Such, doubtless, was the fact. "Many of the most eminent men of the day came to see and hear; but *few there were*, (or *none*,) who dreamt of the untold service to be rendered to mankind." Professor

EXTRACT No. V.

"*The Journal of the Society of Arts*," October 26th, 1866.

THE ELECTRIC TELEGRAPH OF ENGLAND.

Sir,—I request the favour of your inserting in your impression of this week, the accompanying Award of the late Sir Isambard Brunel and Professor Daniell, in an Arbitration which took place in 1841, on some controverted points as to the invention and origination of the electric telegraph.

With the Award, which you will observe is ratified by the signatures of both Professor Wheatstone and myself, I send two volumes published by me in 1856, in consequence of circumstances fully explained in the preface to the first volume, which I hope the Society of Arts, as guardian of the history of practical science, will allow to be placed in its library.

The first volume contains three pamphlets, published by Professor Wheatstone and myself in 1854 and 1856, arising out of an article which had appeared in the *Quarterly Review*. The second volume contains copies of the statements and drawings which were laid before the Arbitrators.

My excuse for troubling you with this letter is that the "*Times*" is claiming for Professor Wheatstone the sole invention of the electric telegraph, and refuses insertion to letters from my friends calling attention to the Award.

I am, &c.,

WILLIAM FOTHERGILL COOKE.

Aberia, Carnarvon, Oct. 24, 1866.

THE AWARD of Sir I. Brunel and Professor Daniell was given at full length in the same journal.—See Award, p. xxvii., *supra*. ED.

Wheatstone himself only thought of "publishing his ideas;" and that, "after the lapse of time." But already—before those "eminent men saw and heard the Professor"—"THE RIGHT MAN had come. MR. COOKE had seen one of those experiments at Heidelberg—had been 'struck with its importance'—and had hastened to England, his brain teeming with inventions for the practical application of the idea he had seized." EXTRACT viii., p. 60.

When another Professor, in a lecture-room at Heidelberg, "exhibited the experiments that (really) led to the Gigantic Undertaking," one—and only one of many—not merely "dreamt of the untold service to mankind," but pondered over it, and realized it. "Among Müncke's hearers was a young officer of the Indian service—MR. WILLIAM FOTHERGILL COOKE. This young soldier went his way full of thought; the grand possibility of a universal Electric Telegraph had flashed upon his imagination. This 'Telegraphic toy' was from the hour of that lecture (March, 1836) destined to be the foundation of the wonder of this inventive age." EXTRACT xxi., p. 77.

IN AMPLE VERIFICATION OF THESE EXTRACTS see the "SKETCH of 1836," pp. 97—104, *infra*. ED.

EXTRACT No. VI.

"*The Reader*," 27th October, 1866.

THE INVENTION OF THE ELECTRIC TELEGRAPH.

Sir,—Under the title "Poetical Justice," your last Number says—

"There is no fear of his being denied an audience, or crushed by a critique. He is more likely to realize the boast of Nelson, who, finding himself unmentioned in the 'Gazette,' declared a day would come when he should have one to himself."

I look for this result in a pending controversy respecting the Invention of the Electric Telegraph. The "Times," in its leading articles, has been claiming public honours for Professor Wheatstone as *Sole* Inventor; but the advertising column, adjoining, of the same powerful Journal, contains an Award made in 1841, between William Fothergill Cooke and Professor Charles Wheatstone, by Sir Isambard Brunel and Professor Daniell, *which denies* to Professor Wheatstone either the *Sole* or the *leading* authorship of the invention.

In its final paragraph, while acknowledging Mr. Wheatstone's scientific merits, the "Award" says that Mr. Cooke is "entitled to stand alone" "for having practically introduced and carried out the Electric Telegraph as a useful undertaking."

By a letter subjoined to the "Award," Mr. Cooke and Mr. Wheatstone acknowledge "the correctness of the *facts* stated in it."

Which are we to believe, the *anonymous testimonial of the leading articles*, or the *judgment signed by the eminent referees*, and confirmed by the signatures of the parties?

I am, Sir, your obedient Servant,

FAIR PLAY.

London, October 23rd, 1866.

EXTRACT No. VII.

"*The Guardian*"—*Editorial*—October 31st, 1866.

Who really invented the electric telegraph? The *Times* of late has been advocating that honour for Professor Wheatstone, but the advertising columns of the same paper contain a formal Award made in 1841 between Mr. W. F. Cooke and Professor C. Wheatstone, signed by Sir I. Brunel and Professor Daniell, *which denies to Wheatstone either the sole invention or the leading share in it*. In the final paragraph, while acknowledging Mr. Wheatstone's scientific merits, the "Award" expressly declares that Mr. Cooke is "entitled to stand alone" for "having practically introduced and carried out the electric telegraph as a useful undertaking," and it is remarkable that both Mr. Cooke and Mr. Wheatstone acknowledge "the correctness of the facts stated in the Award." So the question may be regarded as settled.

EXTRACT No. VIII.

"*The Reader*," November 3rd, 1866.

Sir,—In your last number a correspondent, signing himself "Fair Play," contrasts very forcibly two statements which have recently appeared in the *Times*, and concludes by asking—

"WHICH IS THE TRUTH?"

The one statement in the words of a *leading article* sets forth that to Professor Wheatstone alone is due the credit of having originated the Electric Telegraph. The other, finding place in the columns of the same journal, says that "*Mr. Cooke is entitled to stand alone* as the gentleman to whom this country is indebted for having practically introduced and carried out the Electric Telegraph as a useful undertaking, &c., &c." The former statement is anonymous, unsupported by authority or evidence; the latter forms part of an Award or judgment of two eminent men who give the grounds on which they founded their decision, after having before them printed evidence, models, and witnesses, as well as the litigants themselves; nay, the Award was more than an ordinary judgment, to which rarely do both litigants give even an unwilling assent; not as in the fable does each receive but an empty shell whilst the judge swallows the oyster; here the oyster is awarded, and yet do both parties cordially acknowledge the correctness of the judgment, and their sense of gratitude to the judges.

In the first volume of Mr. Fothergill Cooke's work, he, with great fairness, reprints, not only his own statement, but Professor Wheatstone's reply, and, further, his own most telling rejoinder, the force of which ten years ago silenced the enemy's guns, if it did not cause him to strike his colours. I think no one can read this volume without noticing in every page that the contested point (the oyster) was *the honour of having originated and carried out the Electric Telegraph as a useful undertaking*, and this was the point settled by the Award.

There is something very remarkable in the arrangement and wording of that document; it begins by stating that "in 1836 all that was known of electric telegraphy was that it was a possible means of communicating intelligence, which had been tried and exhibited during many years by various philosophers." At last "*THE RIGHT MAN*" comes. Mr. Cooke has seen one of these experiments at Heidelberg; he "is struck with its vast importance," hastens to England, his brain teeming with inventions for the practical application of the idea it has seized, he makes his instruments, arranges with a railway company for a field of operations, and seeks scientific aid from Faraday, Roget, and Wheatstone. They wind up their recital by declaring that "*Mr. Cooke is entitled to stand alone*," &c., &c., whilst high honour is due to Professor Wheatstone for his scientific investigations, whereby the public had been prepared for the great project. Freely admitting *that*, what more was wanted? Just what the Litigants supply, viz., their cordial acknowledgment of the correctness of the facts.

I would appeal to the *honest judgment* of all those under whose eye the Award of Sir

Isambard Brunel and Professor Daniell may pass, whether Mr. Fothergill Cooke *is not the man* who originated and established that electric telegraph, which, as the *Times* says, "has now brought the whole world within a moment of time?"

I enclose my card, and am, Sir,

Your most obedient servant,

Dorchester, October 29th, 1866.

R. A.

EXTRACT No. IX.

"*Preston Herald*,"—*Editorial*—Nov. 10th, 1866.

THE ELECTRIC TELEGRAPH.

"*Palmam qui meruit ferat.*"

The signal, and to some people unexpected, success attending the laying of the Atlantic Cable has naturally directed public attention in a special manner to the electric telegraph, and to all concerned in the invention and the development of the grandest idea of modern times.

Our powerful contemporary the *Times*, observing the bent of public thought, has assumed its proper office and attempted to assist us out of a difficulty; *but, as we think, with very little success.* The people of England, yielding to a generous impulse, are asking, "*Who invented the electric telegraph?*" in order that they may single out and confer honours upon one who has deserved much at their hands. The *Times* answers the question, spontaneously put, *at random*—either without thought, or *with a determination to refuse to be influenced by evidence*—and calls upon us to do honour to Professor Wheatstone as the inventor. But we are by no means convinced that Professor Wheatstone is fairly entitled to that honour; and as the subject is one of national importance, we will endeavour to give the reasons why we do not, in this instance, accept the dictum of "the leading journal."

We will commence by stating that in our opinion—and we have read much evidence upon the matter—it is almost impossible to say who was the original inventor or parent of that first grand idea which has led up to the present magnificent results. There can be no doubt, however, that *a few* among the many have greatly distinguished themselves, and it will be found, as far as our English men of science are concerned, that *one man is specially entitled to the credit, not of the invention, but of having practically introduced and carried out the electric telegraph* as an undertaking of great national importance. That man is not Professor Wheatstone, as the "*Times*" would have us believe. The gentleman entitled to that amount of credit—and we are glad to see that, with becoming modesty, he claims no more—is Mr. William Fothergill Cooke.

From a statement now placed before the public in a prominent manner, embodied in an "Award" of the late Sir Isambard Brunel and Professor Daniell, we glean the whole history of the introduction of the electric telegraph into this country. (Here follows a long extract from the Award.)

It will thus be seen that, possessed of an idea caught at Heidelberg, Mr. Cooke came to England, and while turning his idea to practical account, he found Professor Wheatstone engaged in the study of another, but no less useful branch of the subject then absorbing his attention. The two men entered into partnership together for their mutual good, and it is very evident that, at that time, Mr. Cooke *was recognised* by Professor Wheatstone *as the leading spirit in the practical working of their great project*. The terms of their partnership vested in Mr. Cooke, *as the originator of the undertaking, the exclusive management of the invention* in Great Britain, Ireland, and the colonies, with the engineering department, and all the benefits arising from the laying down of the lines and the manufacture of the instruments.

It happened, however, that in course of time Professor Wheatstone laid claim to more than his share of the credit. The dispute was submitted to two eminent men, Sir Isambard Brunel and Professor Daniell, whose Award appears to have given entire satisfaction to Mr. Cooke and Professor Wheatstone, and from that Award we have taken the facts here adduced. In the concluding paragraph of that document, however, so much is conveyed that we will quote it entire. The arbitrators say: "Whilst Mr. Cooke is entitled to stand alone, as the gentleman to whom this country is indebted . . . and Professor Wheatstone is acknowledged as the scientific man whose profound and successful researches . . . It is to their united labours . . ."

This fair award was accepted in its fullest sense—as will be seen by the following letter, addressed by Mr. Cooke and Professor Wheatstone to the arbitrators:—

"London, April 27, 1841.

"Gentlemen,—We cordially acknowledge the correctness of the facts stated in the above document."

Enough has been adduced here, we hope, to show the true state of the case, and with such facts before us we are bound to say that we are much astonished at finding that the "Times" *refusing to accept or to publish explanations—persists in demanding all the honours* for Professor Wheatstone as the *sole* inventor of the electric telegraph. "*Pal-mam qui meruit ferat.*" The balance of evidence is most decidedly in favour of Mr. Cooke. That gentleman is "entitled to stand alone" *as the man to whom this country is indebted for having practically developed a grand invention, so gradual in its dawn-ing upon the human mind that it is now impossible to attribute its parentage to any one man*. Give him the honour due to him, then, *for he is deserving of it*. With that modesty which is the characteristic of men of genius, Mr. Cooke seeks nothing more than his share of the credit due to those who have laid the whole world under obligations to them; but, with persistence and courage, for which nobody will blame him, he demands justice when he finds a powerful organ of public opinion seeking to confer upon another honours to which he is himself justly entitled. That justice will be done in the matter we are fully convinced; and it is only with the desire that honour should be awarded where honour is due, that we have called public attention to this highly interesting subject. We know nothing personally of either Mr. Cooke or Mr. Wheatstone; we seek to elicit nothing but the truth, feeling that it would be a great disaster to make a mistake in awarding honours upon an occasion of such great national importance.

EXTRACT No. X.

"The Reader," November 10th, 1866.

INVENTION OF THE ELECTRIC TELEGRAPH.

Sir,—It is not my intention to answer the pithy question of "Fair Play," in your last number, as to whether the laurel crown, justly due to the *Inventor* or Inventors of the Electric Telegraph, should rest on the brow of either of the present claimants; but granting that Mr. W. Fothergill Cooke is justified, under the arbitrators award, in claiming the honor of "standing alone in having practically introduced and carried out the Electric Telegraph as a useful undertaking," still there is another passage in the award which suggests an enquiry which all lovers of fair play would like to see clearly answered, namely, "Messrs. Cooke and Wheatstone, standing as partners on a perfect equality, were to divide equally all proceeds arising from the granting of licenses, and from sale of patent rights." Now, it is generally believed that Mr. W. F. Cooke received a much larger proportion of these payments than Professor Wheatstone; query then, were the proceeds so divided? and if not—why not?

I am, Sir, yours &c.,

C.E.

EXTRACT No. XI.

To the Editor of "THE READER," November 10th, 1866.

Sir,—I shall be obliged by your inserting in your next number, the accompanying copy of a letter which I have written to Professor Wheatstone.

I am, Sir,

Your obedient Servant,

W. FOTHERGILL COOKE.

Nov. 8th, 1866.

Professor Wheatstone, &c., &c., &c.

Sir,—It is nearly thirty years since I consulted Dr. Faraday, Dr. Roget, and lastly yourself on scientific questions relative to a practical Electric Telegraph for which I was about to take out a patent. For fourteen years previously you had been trying experiments and giving lectures of scientific merit, but without practical result, on sound and electricity. I was induced to admit you into my patent, your name followed mine, you paid the larger share of the cost of the patent, you agreed that my past experiments should be paid for by our partnership, and yours not.

Presently I found that your friends were talking about the Electric Telegraph as Mr. Wheatstone's, ignoring Mr. Cooke. I requested you, by a letter since published,

to remove this misapprehension—I told you that your friends were getting you into a false position—you spoke fairly, but did nothing; till at last I brought home to yourself some of the worst of the mis-statements, of which I had been complaining—you then threw off the mask, and openly assumed to yourself the sole merit of the invention.

I required that our differences should be referred to arbitration; and the late Sir Isambard Brunel and Professor Daniell were thereupon empowered by us, to “determine conclusively, in what shares, and with what priorities and relative degrees of merit, we were co-inventors of the Electric Telegraph.” Their award has been published with your letter of acceptance appended to it, and with the documents and drawings of instruments on which, together with the instruments themselves, the award was founded.

The award took up the question in March, 1836, when being accidentally present, at Heidelberg, at a lecture-room experiment, such as you had been repeating annually at King’s College, I was struck with the conviction that the Electric Telegraph might be something better than a philosophic toy. The award proceeded to record my instant abandonment of the profession in which I was engaged; and my devotion of myself, thenceforth, to the realization of the great idea which had taken possession of my mind. It told of my coming, in the next month, to England, to perfect my plans and instruments; and of the commencement of our acquaintance in February, 1837, while I was engaged in completing a set of instruments for an intended experimental application of my telegraph to a tunnel on the Liverpool and Manchester Railway.

The award then mentioned, in the second place, *in language suggested by yourself*, the researches and experiments in which you had previously been engaged, and by its concluding paragraph declared me to be “entitled to stand alone, as the gentleman to whom this country is indebted for having practically introduced and carried out the Electric Telegraph as a useful undertaking.”

I fondly supposed our controversy to be ended; but I soon found that, among Professor Wheatstone’s friends, the Professor had not ceased to be the sole inventor of the electric telegraph, with Mr. Cooke for a business assistant. I again remonstrated; but was silenced, if not satisfied, by reiterated letters from your solicitor, assuring me of your unqualified submission to the award. My new grievance culminated in an article which appeared in the “Quarterly Review,” in 1854, and which I can prove, as regards the question between us, to have been “prompted exclusively” by yourself.

This new aggression revived our controversy of 1841. I published all the statements, and documents, and drawings of instruments, that were before the arbitrators at the time when the award was made. But my readers were few—your audience at King’s College and elsewhere innumerable. So you have succeeded to some extent in maintaining your position. We have recently heard of “the neglect of an ungrateful public to give due honour to the man who has brought the whole civilised world within an instant of time.”

Now, Sir, let me ask you seriously—What is the use of all this? Do you think that even the influence of those numerous and zealous friends who laud your merits on the faith of your statements, can permanently stifle the award of our eminent referees, and the conclusive published evidence on which it rests? What do you expect to gain in the long run from laudatory statements disproved by facts well known to you, and accessible

to every one who cares enough about the subject to read our pamphlets or the published arbitration papers?

I have a further enquiry to make. In 1854 I fixed you as a party to insinuations then current, to the effect that you had not received all the money you were entitled to. These insinuations I hear whispered again. Are you a party to them now? Before you answer this question, I hope you will reflect on the explanations published by me in 1854, and which I have now republished with a copy of the original estimates, which determined the price of the patents. A copy of my new edition is enclosed with this letter.

Permit me to recall the leading facts to your recollection. The award recorded my title as "originator of the undertaking," to "the exclusive management of the invention with the exclusive engineering department, as between ourselves, and all the benefits arising from the laying down of the lines and the manufacture of the instruments."

At the beginning of 1843 our patents were at their lowest point of depression. You were considerably indebted to me; you knew my means to be as scanty as your own; and you were unwilling to contribute to a large further outlay of capital which seemed to be immediately needful, if the invention was ever to be remunerative to either of us. You expressed on several occasions, as a published letter proves, "a wish to withdraw from all active interference in the patent business." It was then arranged that you should make over the patents to me, receiving, without expense or risk, a royalty on the telegraphs that should afterwards be constructed. Published documents prove that the amount of this royalty per mile was fixed (fairly fixed, I think) by yourself and your solicitor, after a very full written communication to each of you separately of all the facts within my knowledge bearing upon the question, and after a distinct written notice from me that you must be guided by your solicitor's judgment and your own in fixing the mileage which you would be willing to accept. I was about to embark in a hopeful but doubtful speculation all the means that I could raise; you had declined to share the burden with me; and I avowed to you in writing, before you formed your conclusions, that I hoped to benefit largely by the outlay thus thrown on myself alone, if my plans for the extension of the telegraph should prove successful.

I incurred the requisite outlay; and paid out of my own pocket your royalty on the work represented by it. At length my labours were crowned with complete success. In the speculative year, 1845, the patents which you had assigned to me became the subject of repeated negotiations. I offered them for sale, subject to your royalty; and by request of the persons with whom I was then in treaty, I inquired whether you would sell the royalty. Your answer was produced to the promoters in each successive negotiation. Ultimately you received in cash the price named by you; and the letters which have been published prove that you had before you, when you fixed it, the latest information that I could give. My letter of the 15th September, 1845, written to ask for an extension of the time within which your offer to sell the royalty was to be accepted, commences thus, "I have received an order for the Dover Line."

The account now re-published shews that I sold the patents and property with a guarantee which might have been onerous, and that, being at the time £4,908 out of pocket,

I received, in reimbursement of that outlay, and as the net result to me of the sale, £96,066; thus: £2,566 in cash, £48,000 out of expected future profits which, in fact, it took four years to gather in, and £45,500 in shares liable to calls to the amount of £136,500, which calls were afterwards, in fact, made. The shares yielded no dividends for six years, during several of which the question of success or failure was on the balance. Moreover, the original estimates, now first published, which determined the price of the patents, show that the works in hand, or in immediate prospect, independently of the general good-will of my contracting business, were valued to the purchasers at £56,000, and that I offered to retain them in payment of so much of the stipulated price of the patents, works, and business.

With these figures before you, do you continue to be dissatisfied with the £33,219 cash received by you, without expense or risk, in payment and in purchase of your royalties? If so, pray make me acquainted with the grounds of your dissatisfaction.

I will close my letter in the language of a concluding passage of my reply to your pamphlet of 1856 :—"The Award cannot be both true and false. If it is true, why have you not acted in accordance with it? If it is false, why did you put your name to a cordial and grateful acknowledgment of the correctness of facts stated in it? There is no escape from this dilemma, and though it is now, as I long since warned you it one day would be, beyond your power to do me justice without dishonour to yourself, a frank confession of your error will attach to your well-known name a fainter and less-enduring stigma than any renewed attempt to justify an inconsistent and disingenuous course of conduct."

I write this letter for publication,

And am, Sir,

Your obedient Servant,

Aberia, Carnarvon,

W. FOTHERGILL COOKE.

November 6th, 1866.

EXTRACT No. XII.

"*The Army and Navy Gazette*"—*Editorial*—Nov 17, 1866.

REVIEWS.

THE STUDENT'S TEXT-BOOK OF ELECTRICITY. BY HENRY M. NOAD.
THE ELECTRIC TELEGRAPH. BY W. F. COOKE.

The great events which have been accomplished during the present autumn—the successful laying of the new Atlantic Cable, and the still more wonderful recovery of that of 1865, render a work of this description particularly attractive, and naturally lead the reader to pause and consider to whom may be awarded the merit of having first conceived the idea of practical electric telegraphy, and *subsequently realised it so completely. To Professor Wheatstone and William Fothergill Cooke this credit appears*

to be fairly due. To the latter, the high honour of having first conceived the idea; to the former, that of having conjointly with Mr. Cooke successfully applied his great scientific attainments to maturing and improving it. This appears at all events to have been the opinion of Sir M. Brunel and Professor Daniell, so far back as 1841.

The Government, anxious to mark its appreciation of lofty deeds, selected certain persons as fitted for peculiar honours, and at once gave umbrage to many. The first bone of contention that has cropped up is as to who was the originator of the idea of the Atlantic cable. The credit has fallen to the lot of several, but *their right is boldly challenged* by another whose name has not been even mentioned, and yet who publishes strong evidence to prove that the honour is solely due to him—*Mr. Frederick Gisborne.* Another bone arises in the shape of the electric telegraph; was it invented by Professor Wheatstone, or by Mr. Cooke? The pamphlet just published by the last-named gentleman goes far to show that the claims of his quondam *colaborateur*, although so strongly advocated by one leading journal, *are not altogether above suspicion.* Mr. Cooke grapples with the question boldly; no one can say that he does not “call a spade a spade.” He charges the Professor *with suggesting an article in the “Quarterly,” written for the purpose of appropriating to himself the sole merit of the invention, notwithstanding the existence of the formal award made by Brunel and Daniell in 1841. It certainly will be difficult to explain away a record of this description,* sought for advisedly, acknowledged gratefully, and regarded as satisfactory, at least to a certain period.

EXTRACT No. XIII.

“*The Saturday Review*,”—Editorial—November 17, 1866.

WHO INVENTED THE ELECTRIC TELEGRAPH?

When the remarkable achievement of laying two Atlantic cables was completed, it occurred to many persons that the occasion was not unsuitable for conferring some public honour on the inventor or inventors of electric telegraphs. The wonderful exhibition of mechanical skill in the recovery of the lost cable of 1865, although admirable in itself, could not be compared, as a proof of scientific genius, with the discovery of electrical communication.

Of all English contributors to telegraphic science, Mr. Wheatstone is best known, and *it was natural* that he should be mentioned as the principal claimant of honorary recognition. Mr. Wheatstone's exclusive pretensions to originality have since been questioned by Mr. William Fothergill Cooke, in an advertisement which sets out an award or adjudication made a quarter of a century ago by Sir Isambard Brunel and Professor Daniell. The umpires appear to have been *induced by an amiable desire of conciliation to suppress any opinion* which they may have entertained on the question submitted to their judgment. They declared that Mr. Cooke was “*entitled to stand*

alone as the gentleman to whom this country is indebted for having practically introduced and carried out the electric telegraph as a useful undertaking, promising to be a work of national importance." Professor Wheatstone, on the other hand, "is acknowledged as the scientific man whose profound and successful researches had already prepared the public to receive it as a project *capable* of practical application." *'It is to the united labours of two gentlemen so well qualified for mutual assistance, that we must attribute the rapid progress which this important invention has made during the five years they have been associated.'* For all that appears on the face of the award, Mr. Wheatstone may never have contrived a telegraph, and Mr. Cooke may never have seen one. A capitalist who had found the money for the experiment, and an electrician who had made useful preliminary investigations, might have divided between them the credit which the arbitrators probably intended to distribute between two scientific discoverers.

Non nostrum inter vos tantas componere lites,
Et vitulâ tu dignus et hic.

It is not recorded whether the shepherds in Virgil were satisfied with the judgment of their venerable friend; but the Menalcas and Damœtas of the telegraph accepted at the time with amiable readiness the unmeaning award of their duplicate Palæmon.

In a pamphlet previously published, Mr. Cooke *had asserted that he had himself separately invented the telegraph*;^{*} and Mr. Wheatstone had *replied by denying the claim, on the ground that in 1823 the principle had been "developed completely and effectually by Mr. Ronalds."* Menalcas had insisted on his exclusive right to the calf, and Damœtas had set up a preferable title in an absent Corydon.

The great services of Mr. Wheatstone are generally acknowledged, and *there is no reason to question the claims of Mr. Cooke*; but as both of the parties to the Brunel award have deservedly acquired both fame and profit by their telegraphic exploits, it is but just that the modest merit of Mr. Ronalds, who happily still survives, should not be forgotten. In the preface to his pamphlet of 1823, Mr. Ronalds "takes leave of the science" which was destined in his own lifetime to attract the attention and wonder of the world.

The answer returned by the Admiralty in 1816 to Mr. Ronalds's proposal of an Electric Telegraph has already become deservedly famous. The inventor reports the rebuff which he received with a patient humour which proves that he understood, with an Englishman's intuitive familiarity, the official spirit of the Constitution.

^{*} That "Mr. Cooke had asserted that he had himself separately invented the Telegraph," *is a mistake of the writer of the article.* Mr. Cooke's claim (as quoted by Professor Wheatstone from Mr. Cooke's letter of the 20th October, 1840, before the arbitration) was to be "*the ORIGINAL PROJECTOR; and the inventor, equally and jointly with yourself* (Professor Wheatstone), *standing in point of merit upon precisely the same footing.*"—(Wheatstone's Answer, Vol. I. p. 51). The Award pronounced, in accordance with that claim, that Mr. Cooke was the "*ORIGINATOR of the Undertaking*"—and "*entitled to stand alone for practically introducing and carrying out the Electric Telegraph.*" The Award also declared, that Cooke and Wheatstone stood "*on the footing of equality for their existing inventions.*" Thus, the Award in April, 1841, sustained Mr. Cooke's claim in his letter of October, 1840. Ed.

It is pleasant to trace the historical continuity of official precedents from 1816 to 1860. In the same metaphorical or poetic sense in which the child is the father of the man, Lord Melville may be regarded as the parent or ancestor of the Duke of Somerset. Although Captain Cowper Coles falls far short of Mr. Ronalds in amiable equanimity, no sea-going turret-ship has yet been allowed to disturb the traditions of the navy. An officer has lately republished a letter which he addressed some years since to the War Office on the properties of Morse's breech-loading rifle. His suggestions were rejected, because so rapid a fire would waste ammunition; because Morse's cartridge contained the means of ignition within itself; and because it was enclosed in a metallic covering. There is reason to fear that General Peel has so far degenerated from his predecessors that he is about to supply the army with a rifle which is subject to all these objections.

Conductors of private enterprise have to live by their vigilance, and, if they fail to meet external competition, the loss falls on themselves. If Watt and Arkwright had depended on the Government, they would have been assured that the use of mechanical power and its application to the production of textile fabrics were wholly unnecessary; and that therefore horses would be employed instead of steam-engines, and spinning-jennies would not be allowed to supersede old-fashioned wheels. It seldom happens that the author of a great discovery, after failing to attract attention to his application of science, lives to see his own invention universally adopted. Mr. Ronalds appears to be the least pushing of original inventors, and it is just that in his later years he should have the satisfaction of knowing that he is appreciated by his countrymen.

EXTRACT No. XIV.

"The Dublin Daily Express," Nov. 21, 1866.

INVENTION OF THE TELEGRAPH.

To the Editor of the Daily Express.†

Sir,—Considerable misunderstanding exists, unfortunately, in the public mind as to the relative merits of the different persons who have claimed the honour of having introduced, or, as it is sometimes termed, having "invented" the Electric Telegraph.

The following brief notice, by one who has been identified with the electric telegraph since the incorporation of the first—the Electric—Telegraph Company twenty years ago, will, I trust, not be considered out of place in your columns:—

As each property of electricity became known, its velocity being popularly considered instantaneous, it immediately suggested the idea of its application for rapid communication to a distance.

Telegraphs were actually made, and worked from one room to another, by means of

† This letter also appeared in the "Railway Times," the "Reader," "The Court Circular," and other papers. Ed.

static electricity, as far back as the last century ; but the first person who proposed a telegraph worked by the Voltaic battery, and who realized it, was S  mmering. On the 6th of August, 1809, he constructed a telegraph, and exhibited it working through 2,000 feet of wire.

This telegraph depended on the decomposition of water by Voltaic electricity.

In the year 1802 Romagnosi discovered (and published the fact in Paris in 1804) that when a magnetized needle is submitted to the action of a galvanic current, it is deflected.

In 1819 Oersted drew more particular attention to this fact, and from it resulted the galvanometer and the electro-magnet.

It was Robert Norman, of the sixteenth century, to whom we owe the dipping-needle, which gave rise to the vertical galvanometer or needle telegraph.

The needle telegraph was the one first used in this country practically.

Electric telegraphs of different forms were proposed or invented by many. There were Alexander, Steinheil, Davy, and several others, all obtaining communication in different ways by means of Voltaic electricity.

Baron Schelling seems to have been the first to have constructed a submarine telegraph under the River Neva, at St. Petersburg. It was he who constructed the first electro-magnetic telegraph, and in 1830 the Emperor of Russia saw it at work at Schelling's residence, when a distant mine was exploded by electricity before the Emperor.

The same year Schelling started on a journey to China, and took his telegraph with him. He says he found it of great service, as it procured him introductions, and assisted him greatly in the object of his journey.

To Sir William Watson is due the credit of having pointed out that the earth can be used to complete an electric circuit, and thus only one wire is necessary instead of two.

It will, therefore, be seen that telegraphs were not only constructed, exhibited, and worked at a very early date by scientific men, but that S  mmering had even proposed and exhibited his telegraph in 1809, which he described could be worked "by night as well as by day." In a word, the inventors of the electric telegraph are legion.

When in 1836 Mr. Cooke saw for the first time at Heidelberg a telegraph model at work, Baron Schelling's instrument, he immediately foresaw the great advantages to society that would result from its general introduction, and he set himself to work to realize this great idea.

So diligently did he pursue his object, that within twelve months he had invented a telegraph suitable for practical use. It was Mr. Cooke who first applied the attraction produced by Voltaic electricity to the detent of a clock train, to control its motion or to ring a bell, an important step in practical telegraphy, and he at once entered into negotiations with the then Leeds and Manchester Railway for the construction of a telegraph on their line.

After this he found many difficulties in his way, the moment he had to telegraph through long distances, and immediately applied to the fountain-head for information, viz., to Professor Faraday.

He was subsequently advised by Dr. Roget to consult Professor Wheatstone, an un-

doubtedly clever man, and having then in his possession at King's College a considerable length of insulated wire ready for experimental purposes.

In 1837 Cooke and Wheatstone took out their first patent, and the Electric Telegraph shortly afterwards, thanks to Mr. Cooke's enthusiasm and energy, took root, and spread over the length and breadth of the land. It was William Fothergill Cooke who went out on the railway lines to combat the mechanical and other difficulties inseparable from all new works; he who carried out the negotiations with the railway companies for the erection of the telegraphs on their lines; and it was he who proved to Robert Stephenson, Mr. Ricardo, and those gentlemen who formed the nucleus of the Electric Telegraph Company, that the electric telegraph was no chimera, but a really sound, practical, commercial undertaking.

So successful was he, that eight years did not elapse before there were telegraph circuits ninety miles in length at work between Gosport and London.

No one will, I hope, for a moment doubt that Mr. Wheatstone was a most active and useful scientific adviser to, and co-operator with Mr. Cooke, and that a very great amount of credit is due to him; but when we consider the question as to whom Europe is indebted for the introduction of the telegraph as a great commercial undertaking, the credit must undoubtedly belong to Mr. W. F. Cooke, for had he not happily been introduced to Professor Wheatstone, his energy and enthusiasm were such that the telegraph would still have been a *fait accompli*, though probably not perfected so soon, for he would have sought other scientific aid to help him to combat the difficulties which presented themselves. When Mr. Cooke became acquainted with Professor Wheatstone, the latter gentleman had not made any progress in the shape of meeting the requirements of the public, or anything like a suitable telegraph for practical communication; but still there is no doubt that he was already familiar with the labours of Ohm, the father of electric law, with those of Oersted and others; and there can be no doubt that Mr. Cooke knew but little of electricity when he first saw the telegraph model exhibited at Heidelberg. But while philosophers, so to speak, were playing with the telegraph, and exhibiting it as a "possibility," Mr. Cooke grasped the electric toy, and converted it into one of the subtlest and most valuable agents the world has ever beheld. That the world was ripe for the telegraph is evident from the fact that, while Cooke and Wheatstone were at work in Europe, Professor Morse, aided by the American Faraday, Professor Henry, of Washington, were at work inventing and introducing a practical telegraph. The energetic Morse, like Cooke, knew but little of electricity, and it is Professor Henry's honour to have helped him over his greatest electric difficulties.

Many philosophers have invented electric telegraphs; many had foreseen their great use; but the one man of indomitable energy, perseverance, and foresight, who took the matter up and forced the public into its recognition, is, undoubtedly, William Fothergill Cooke.

I may end with the remark, that it is but seldom our nation acknowledges those to whom credit is really due, and still more rarely does the acknowledgment, even when tardy, carry with it any tangible mark.

I am, Sir, your very obedient servant,

CROMWELL F. VARLEY.

EXTRACT No. XV.

"The Daily News,"—Editorial—Nov. 22, 1866.

The success of the Atlantic Cable has given rise to a controversy as to the first invention of the Electric Telegraph which is now attracting public attention. It is remarked that while honours have been freely distributed for the Atlantic Telegraph, none have been conferred on those who first invented the electric telegraph itself; that they have been passed by wholly unnoticed in the recent distribution of public honours, though but for their discoveries the Atlantic experiment itself could never have been so much as tried. Yet among others the name of Mr. WHEATSTONE is well known, and a leading journal has loudly demanded for him the merit of the first invention of the electric telegraph, and the honour to which such a claim, IF WELL FOUNDED, would justly entitle him. This claim, however, is not unchallenged. It appears from a letter which we lately inserted from a correspondent that fifty years ago Mr. FRANCIS RONALDS, invented and offered to the then government an "electric telegraph" which he had constructed and put in operation.

Mr. RONALDS published in 1823 a pamphlet entitled "Descriptions of an Electrical Telegraph, and of some other Electrical Apparatus," describing what he had done, and illustrating his invention by drawings. He there predicts with a remarkable foresight some of the purposes to which the invention might be applied. . . . A more striking instance of scientific foresight cannot well be imagined. Mr. RONALDS, being probably more of a philosopher than a man of business, took out no patent; and it was not till 1837 that the first patent was taken out by Messrs. COOKE and WHEATSTONE.†

We cannot see, therefore, how a priority of invention over Mr. RONALDS can be claimed for either Mr. WHEATSTONE or Mr. COOKE. But whatever may be the relative merits of these gentlemen, it would be a strange thing *if the men who first discovered, or developed and brought to perfection*, the most wonderful and useful invention of modern times should be deemed unworthy of the slightest public notice, when so striking an instance has occurred of the successful application of their labours. It would be a national reproach, not possible in any other country than England, if claims of such a nature were met with nothing but indifference and contempt.

EXTRACT No. XVI.

"Suffolk and Essex Free Press"—Editorial—November 22, 1866.

There has been recently some controversy in the "Times" as to whether Mr. Cooke or Mr. Wheatstone was entitled to the merit of being the original inventor of the Prac-

† See Extract xxii., p. 79. Letter from W. Fothergill Cooke to the "Reader," bearing witness to Mr. Francis Ronalds' merits as a practical pioneer of electric telegraphy.—Ed.

tical Electric Telegraph. Mr. W. F. Cooke has written a letter to Professor Wheatstone, from which we make the following extracts. Mr. Cooke states—

“Sir,—It is thirty years since I consulted Dr. Faraday, Dr. Roget, and lastly, yourself on scientific questions relative to a practical Electric Telegraph, for which I was about to take out a patent.

“I was induced to admit you into my patent, your name followed mine, you paid the larger share of the cost of the patent, you agreed that my past experiments should be paid for by our partnership, and yours not.

“Presently I found that your friends were talking about the Electric Telegraph as Mr. Wheatstone's, ignoring Mr. Cooke.

“I required that our differences should be referred to arbitration; the late Sir Isambard Brunel and Professor Daniell were elected arbitrators.

“Their award has been published with your letter of acceptance appended to it.
 By its concluding paragraph, it declared me to be
 ‘entitled to stand alone as the gentleman to whom this country is indebted for having practically introduced and carried out the Electric Telegraph as a useful undertaking.’

“The award cannot be both true and false. If it is true, why have you not acted in accordance with it? If it is false, why did you put your name to a cordial and grateful acknowledgment of the correctness of the facts stated in it? There is no escape from this dilemma, and though it is now, as I long since warned you it one day would be, beyond your power to do me justice without dishonour to yourself, a frank confession of your error will attach to your well-known name a fainter and less-enduring stigma than any renewed attempt to justify an inconsistent and disingenuous course of conduct.

“I write this letter for publication.”

EXTRACT No. XVII.

“*The Hampshire Advertiser*,” November 24, 1866,

Publishes at full length the letter of C. E., Ext. x., and Mr. Cooke's letter to Professor Wheatstone, Ext. xi., and also quotes the following paragraph from the “Daily News:”

“We cannot see how a priority of invention over Mr. Ronalds can be claimed for either Mr. Wheatstone or Mr. Cooke. But, whatever may be the relative merits of these gentlemen, it would be a strange thing, if the men, who first developed and brought to perfection the most wonderful and useful invention of modern times, should be deemed unworthy of the slightest public notice.”

EXTRACT No. XVIII.

"The Morning Post"—Editorial—November 26, 1866.

WHO INVENTED THE ELECTRIC TELEGRAPH?

The triumphant success, scientifically, of the Atlantic telegraph, has roused public attention more forcibly to the importance of telegraphic communication, and the question has again arisen—to whom is the world indebted for the invention? Professor Wheatstone has been put forward as the man. It must be generally admitted that to Professor Wheatstone belongs the merit of indicating much more perfectly than any previous attempt how communications might be transmitted through wires by voltaic electricity.

Of the former attempts to construct an electric telegraph, those of Sæmmering and Ronalds were the most deserving notice. In Mr. Ronalds's telegraph frictional electricity was employed, but it possessed the important advantage of being worked with a single wire. Mr. Ronalds carried out the plan so far as to work it successfully through six miles of insulated wire in his own garden at Hammersmith.

But to return to Professor Wheatstone. *After many years of application he had not in 1835 succeeded in bringing his invention into practical operation, and the instruments he had contrived were not of a kind that could be worked at a distance without great expense and uncertainty.* While in the throes of invention he was introduced to Mr. W. F. Cooke, an energetic Indian officer, who had himself invented some ingenious contrivances for the purpose. Professor Wheatstone and Mr. Cooke soon perceived that it would be to their mutual advantage to co-operate, and, having entered into partnership, they took out their first patent in 1837, in which the name of Mr. Cooke stood before that of Professor Wheatstone. Both of them being men of scanty means, they had many difficulties to contend with, *but the energy and perseverance of Mr. Cooke finally overcame them all.*

A difference arose between them as to their respective merits as inventors of the electric telegraph. At the request of Mr. Cooke, and with the consent of Professor Wheatstone, Sir Isambard Brunel and Professor Daniell undertook, as arbitrators, to determine the question, and their award was agreed to by both claimants. It was to the effect, that while Professor Wheatstone, as a man of science, had materially aided in perfecting the telegraphic instruments and their modes of working, Mr. Cooke was entitled—

"To stand alone as the gentleman to whom this country is indebted for having practically introduced and carried out the electric telegraph as a useful undertaking."

EXTRACT No. XIX.

"*The Reader*," December 1, 1866.

THE ELECTRIC TELEGRAPH.

Sir,—In your number of November 10th, Mr. William Fothergill Cooke, in a frank and forcible letter addressed to Professor Wheatstone, challenges that gentleman to refute his statements as to their respective shares in the introduction of practical telegraphy, or to acknowledge their truth. Your readers impatiently await the Professor's reply, but he makes no sign.

This fact is, I think, the best possible evidence that Mr. Cooke's position is unassailable; but I venture to assure the Professor that a tacit acknowledgment, in this instance, scarcely harmonizes with one's views of professional honesty; and, further, that every day he allows to pass without making the tardy *amende honorable*, tends to confirm the growing belief that Mr. Cooke has been defrauded of his title to public recognition, and establishes a painful stigma upon the reputation of Mr. Wheatstone.

I am, Sir, &c.,

Notting Hill, Nov. 21.

G. H.

EXTRACT No. XX.

"*Preston Herald*,"—*Editorial*—December 1st, 1866.

THE ELECTRIC TELEGRAPH.

Believing that our great contemporary the *Times* was altogether wrong in attributing to Professor Wheatstone the credit of the invention of the Electric Telegraph, and that a great injustice would be done if national honours were conferred upon that gentleman upon the supposition that he was actually the inventor, we turned our attention to the matter, and endeavoured to show, in an article published in the *Herald* of the 10th ult., that although Professor Wheatstone had certainly contributed his full share of the many inventions connected with the one grand idea, Mr. W. F. Cooke was actually entitled to the credit of having introduced the idea of communication by electric and magnetic means into England and carried it into practical use. We urged that the origin of the original idea was remote, and no living man could claim its parentage. It is with considerable gratification that we find our views confirmed by a very good authority. We have received a letter from Major Andrewes, R. A. Major Andrewes says:—"I beg to enclose for your perusal an extract from an old book in my possession, entitled "*Scep sis Scientifica*; or, *Confest Ignorance the Way to Science*;" by Joseph Glanvill, M.A., MDCLXV. The extract from this ancient work is highly interesting:—

"That men should confer at very distant removes by an extemporary intercourse, is another reputed impossibility; but yet there are some hints in natural opera-

tions that give us probability that it is feasible, and may be compass without unwarrantable correspondence with the people of the air. That a couple of needles equally touched by the same magnet, being set in two dials exactly proportioned to each other, and circumscribed by the letters of the alphabet, may affect this magnate, hath considerable authorities to avouch it. The manner of it is thus represented:—Let the friends that would communicate take each a dial, and having appointed a time for this sympathetic conference, let one move his impregnate needle to any letter in the alphabet, and its affected fellow will precisely respect the same. So that would I know what my friend would acquaint me with, it is but by observing the letters that are pointed at by my needle, and in their order transcribing them from their sympathizing index, as its motion directs; and I may be assured that my friend described the same with his, and that the words on my paper are of his inditing. Now there will be some ill contrivance in a circumstance of this invention, in that the thus impregnate needles will not move to, but avert from each other, (as ingenious Dr. Brown, in his *Pseudoxia-Epidemica*, hath observed,) yet this cannot prejudice the main design of this way of secret conveyance, since it is but reading counter to the magnetic informer, and noting the letter which is most distant in the Abecedarian circle from that which the needle turns to, and the case is not altered. Now though this pretty contrivance may not yet answer the expectation of inquisitive experiment, yet it is no despicable item that by some other such way of magnetic efficiency it may hereafter with success be attempted, when magical history shall be enlarged by riper inspections; and it is not unlikely but that present discoveries might be improved to the performance."

This, as Major Andrewes observes, is another assurance of the fact that the *idea* had floated in the minds of scientific men for nearly 200 years before it was seized upon by the one who gave it life and practical bearing upon the interests and welfare of mankind,—by, in fact, Mr. William Fothergill Cooke.

We have now said all that need be said upon this subject, perhaps, for we notice that the *Times* has not persevered in pressing the claims of Professor Wheatstone.

EXTRACT No. XXI.

"*The Reader*," December 1st, 1866.

Sir,—It is difficult to realise that the invention and establishment of the electric telegraph should be in our own time a subject of argumentative discussion. This most startling and novel application of science to human ends is scarcely yet thirty years old. The names, the circumstances, that accompanied its advent are in the memory of most of us, the documentary and incidental records are within the reach of all. It must be that

the very familiarity we have with this wonderful agency has blunted the discernment by which otherwise we should, as a nation and as individuals, have given public honours to the author of such a national and public benefit. In the family the electric telegraph has become a "household word," bringing far absent members into sympathetic contact of heart and mind in the same instant of time. Of commerce it has become the very life-blood; it has given it that "new pulse, unknown before," which will henceforth be essential to its progressive life. It has gathered the civilised world together into instant and direct intercourse; a network of sympathetic intelligence encircles the earth, and we feel as though it had always so existed; only when a first pulsation from a new continent responds to ours, as in the recent grand o'erleaping of the Atlantic, do we reflect how incalculable a boon to public and private life was the application of electricity to the transmission of words. Imagine it removed; there is an ebb of centuries in the tide of civilisation. *Since the introduction of printing, there has not arisen an agency so beneficial and ubiquitous.*

Lectures on electricity had been from the commencement of this century a popular feature in colleges and public schools. Early in 1836, a model of Baron Schelling's instrument for showing signals by the deflection of a needle was exhibited at Heidelberg to his pupils, by M. Moncke, a professor of that university. Among them was a young English officer of the Indian service, Mr. William Fothergill Cooke. This young soldier had, during his furlough from India, taken up the study of anatomy, and was then engaged in modelling his dissections for the museum of his father, a professor in the rising University of Durham. This "telegraphic toy" was, from the hour of that lecture, destined to be the foundation of the wonder of this inventive age. On the occasion above recorded, one of the group went his way full of thought. The grand possibility of a universal electric telegraph had flashed upon his imagination.

For days and nights his excited mind meditated over its realization. Within six weeks from the date of that lecture Mr. Cooke was on his way to England, having completed the models and drawings for a practical telegraph. On the narrow foundation of what he had seen in Moncke's lecture room, he had raised his superstructure. He united in one circuit a series of terminal and intermediate instruments, each with its set of keys and alarum. The alarum was put in action by removing a detent from a clockwork alarum, by means of a voltaic magnet excited by the electric current. Each instrument was in itself complete, giving and receiving signals over an extended line of stations, representing before the signaller and recipients exactly the same indications or signals. In 1841, Mr. Cooke writes—

"This united reciprocal property is the basis of the electric telegraph, and inseparable from the practical system. It has been my leading principle throughout, and has impressed itself even upon the form of my instruments; their distinguishing character, from first to last, being, that my keys and signals have always been joined together into one instrument, and the several instruments into one reciprocal system."

While Mr. Cooke was occupied in constructing his Mechanical Electric Telegraph,

he wrote an interesting sketch on the application of his plans to a general system of telegraphy for government, commercial and private purposes, with a description of his detector for discovering faults in the extended system of wires for a national undertaking. This pamphlet is printed at the end of Mr. Cooke's second volume. It elicited, in January, 1837, from Dr. Reynolds, of Liverpool, to whom it was submitted when Mr. Cooke was arranging for the introduction of his telegraph on the Liverpool and Manchester Railway, the following reports :—

“ How the power or agency of electricity can be applied to communicate signals to the extent required I cannot conceive, and on this point Mr. Cooke is silent, no doubt intentionally, as in this evidently consists the essence of his invention, He appears to have bestowed much thought and labour on the subject, and some of his contrivances are very ingenious.” (See Appendix B, p. 97.)

In 1841 Mr. Cooke discovered independently that the earth acted as an excellent conductor of electricity. This fact had, as he afterwards learnt, been previously discovered by our own countryman, Sir William Watson, in 1747, and later by Steinheil. Hitherto electric wires had been at great trouble and cost insulated in the ground. Mr. Cooke now patented his improved system of suspending them in the air, a system which has since followed the telegraph throughout all lands.

From the hour of conceiving his great work, Mr. Cooke threw the whole force of his indomitable energy into the accomplishment of it. The profession that before had been attractive to his ardent and active mind was unhesitatingly abandoned; every anticipation of former days was obliterated by the dazzling vista he saw in the successful issue of the new paths he would hew out. Unaided and alone he elaborated his systems of instruments and signals, and when indebted to a man of known science for help over an electrical difficulty, he generously offered him a partnership, and an equal place with himself in the honors of the enterprise. Mr. Cooke's instruments were not, indeed, perfect for their purposes, but had he been a “ scientific professor,” *and not a great deal besides*, the public might have waited another twenty years listening to electrical lectures.

It must have been more than common generalship that enabled him, in addition to the above, and to the demands of an overwhelming correspondence, directly and personally, to superintend every part of the new construction.

If the temper and tact of a true gentleman assisted in smoothing the obstacles in his path throughout the day, unflagging resolution could alone have nerved the strongest frame to superintend his relays of workmen throughout a great part of the night. The ultimate success of the electric telegraph is well known to the public, but the public do not know how much its success has been the work of this one man.

I venture to say that few men would dare to silence a species of detraction by so frank and complete an exposure of their financial transactions as he has done. Every document, at the time of writing thought to be strictly private and personal, has been laid open to the full light of the public scrutiny, and what is disclosed? Just what anyone acquainted with Mr. Cooke must have been confident of without seeing, that in every instance his dealings were open, honourable, and largely liberal.

No one who has ever been in the society of Mr. W. F. Cooke can have failed to observe that he is a man of the calibre required for the carrying out of a great work. Possessing a mind at once perspicacious and penetrating, enthusiastic and energetic, his faculty of seizing a vague idea and shaping it for useful application, is inherent, and was by no means exhausted when he had accomplished the success of the electric enterprise. No man better than he can command the courage for a difficult undertaking, and carry it on while a point of perfectibility remains unattained.

That the illiberal influence which has pertinaciously sought to deprive Mr. Cooke of the honours justly due to him may be overcome, must be the sincere wish of all lovers of truth.

I am, Sir, yours obediently,

W. J. P.

27th November, 1866.

EXTRACT No. XXII.

"The Reader," Dec. 8, 1866.

MR. RONALDS AND THE ELECTRIC TELEGRAPH.

Sir,—The "Saturday Review" has lately favoured the world with Mr. Wheatstone's "testimony" to the priority of Mr. Ronalds' title to be considered the inventor of the electric telegraph. To what testimony does the "Saturday Review" refer? In the preface to my two volumes of 1857, on this vexed question (reprinted in the fourth edition of my pamphlet, 1866, p. 62), I cited the following passage from Professor Wheatstone's "Answer" to the first edition of that pamphlet:—

"I made, in 1823, my important discovery, that sounds of all kinds might be transmitted perfectly and powerfully through solid wires, and reproduced in distant places. Experiments on a larger scale, however, showed me that the velocity of sound was not sufficient to overcome the resistances and enable it to be transmitted efficiently through long lengths of wire. I then turned my attention to the employment of electricity as the communicating agent; *the experiments of Ronalds and others had failed to produce any impression on the scientific world.*"

My testimony to Mr. Ronalds' invention ran as follows in my above-cited preface of 1857, p. 62:—

"In 1823, Mr. Francis Ronalds, a gentleman well known in the scientific world, published his 'Descriptions of an Electric Telegraph, and of some other Electrical Apparatus;' a work of originality and merit, although, as Mr. Ronalds proposed to work by frictional electricity, through a wire enclosed in a glass tube, his telegraph was not adapted for practical use."

Fourteen years, however, elapsed after 1823 without any practical result being obtained by the Professor—until—

Cooke and Wheatstone first met on the 27th February, 1837, and in the beginning of May applied for their first patent, which was sealed in June.

A few days later, through the active kindness of Mr. Robert Stephenson and Mr. Glyn, permission was given me to try the telegraph at Euston Square, for the working of the fixed engines at Camden Town. The fact is thus stated at page 125, vol. ii., of the Arbitration Papers:—

“Within four months of the sealing of the patent, the Chairman and London Directors of the London and Birmingham Railway Company were decidedly in favour of laying down the electric telegraph from London to Birmingham, in consequence of experiments undertaken and satisfactorily concluded within those four months by Mr. Cooke, upon their line and at their expense.”

Had it been my fortune to have known of Mr. Ronalds' labours, when I returned from Heidelberg in 1836, I cannot have the slightest hesitation in saying that I should have sought his advice, even before that of the great Faraday, and also his co-operation as a partner in my patent. I should have seen at a glance that by giving his signal through a magnetic needle moved by *galvanic*—instead of through diverging pith-balls moved by *static*—electricity, Mr. Ronalds' apparatus would at once have been a practical telegraph—and the glass tubes for insulating the conducting wires would be dispensed with.

“There is a tide in the affairs of men.” Mr. Ronalds *was before the tide*; so was ‘M. of Renfrew,’ whose anonymous suggestion, a century in advance of his time, has recently been made public.† We were all practical men, but it was my good fortune to *take the tide at its flood*.

I need scarcely add the expression of my hearty concurrence in the conclusion of the “Saturday Review”—

“That it is but just that Mr. Ronalds, the least pushing of original inventors, should in his later years have the satisfaction of knowing that he is appreciated by his countrymen.”

I have shown, by my citation of my own testimony twenty-five years back, that he was appreciated by *his successor* in the labour, *at length successful, of producing a working electric telegraph*.

Nor is it for me to confirm, and still less to question, the award of the arbitrators of 1841 (the late Sir Isambard Brunel and Professor Daniell, before whom Mr. Ronalds' book was produced in evidence), that while

† See a most interesting article on the electric telegraph in the “North British Review,” vol. xxii., p. 548.

"Professor Wheatstone is acknowledged as the scientific man whose profound and successful researches have already prepared the public to receive the electric telegraph as a project capable of practical application,"—"Mr. Cooke is entitled to stand alone as the gentleman to whom this country is indebted for having practically introduced and carried out the electric telegraph as a useful undertaking, promising to be a work of national importance." Award, p. xxix.

The promise has been more than fulfilled.

I am, your obedient servant,

Aberia, Carnarvon;

W. FOTHERGILL COOKE.

November 28th, 1866.

EXTRACT No. XXIII.

"*The Court Circular*,"—*Editorial*—Dec. 8, 1866.

WHO INVENTED THE ELECTRIC TELEGRAPH?

As the above question has excited a deal of controversy and public attention in relation to the Atlantic Cable and the honours awarded to those who took part in it, the following statement from the pen of Professor Varley may not be out of place. It is much to be regretted that the original inventor or adapter of so important an agent of civilisation should have been so thoroughly ignored as Mr. Cooke has been in this case, and that his well-earned honours should have been awarded to others who have no substantial claim to them, although it is frequently the fate of inventors and public benefactors :—

"As each property of electricity became known, its velocity being popularly considered instantaneous, it immediately suggested the idea of its application for rapid communication to a distance. Telegraphs were actually made and worked from one room to another, by means of static electricity, as far back as the last century. In a word, the inventors of the electric telegraph are legion.

"When in 1836 Mr. Cooke saw for the first time at Heidelberg a telegraph model at work, Baron Schelling's instrument, he immediately foresaw the great advantage to society that would result from its general introduction, and he set himself to work to realise this great idea.

"No one will, I hope, for a moment doubt that Professor Wheatstone was a most active and useful scientific adviser to, and co-operator with, Mr. Cooke, and that a very great amount of credit is due to him; but when we consider the question as to whom Europe is indebted for the introduction of the telegraph as a great commercial undertaking, then the credit must undoubtedly belong to

Mr. W. F. Cooke. When Mr. Cooke became acquainted with Professor Wheatstone, the latter had not made any progress in the shape of meeting the requirements of the public or anything like a suitable telegraph for practical communication.

"While philosophers, so to speak, were playing with the telegraph, and exhibiting it as a 'possibility,' Mr. Cooke grasped the electric toy, and converted it into one of the subtlest and most valuable agents the world has ever beheld. Many philosophers have invented electric telegraphs; many had foreseen their great use; but the one man of indomitable energy, perseverance, and foresight, who took the matter up, and forced the public into its recognition, is undoubtedly William Fothergill Cooke."

EXTRACT No. XXIV.

"*The Reader*," December 22, 1866.

TELEGRAPHY.

"I want a hero; an uncommon want,
When every year and month sends forth a new one,
Till after filling the Gazettes with cant,
The age discovers he is not the true one."

Don Juan, Canto I.

Sir,—In the hunt for telegraphic inventors, quite a fashionable sport for the moment, the "*Saturday Review*" (Extract xiii.), which always cares more for a telling hit than for carrying with it the conviction of its readers, started a fresh hare a week or two ago, Corydon by name, and ran it sharply back to the Admiralty of Lord Melville's day; thence scared by the younger Barrow, at one stretch of fifty years, doubled back, and ran into the Duke of Somerset, then dodged round Captain Cowper Coles's turret ships, through "the metallic tube of Morse's cartridge" at the War Office, without "exploding the self-contained means of ignition," or being damaged by "the rapid fire which wastes the ammunition." Skirmishing suavely round General Peel, the chase got entangled with Watt and Arkwright, and, finally floundering amongst horses and horsepower, was run into at the end of a sparkling article.

The real object of the chase was evidently not the electric telegraph, of which the writer seems to know very little, nor of its inventors, but a clever "shy" at the Admiralty and War Department from 1816 to 1866—unquestionably "fair game." The official style of argument was very prettily shown up, but the writer's own logic is not much better, for, after justly praising men like "Watt and Arkwright, who commanded success and attained results which were previously impracticable," because they "had not depended on Government, but lived by their vigilance," the writer raises his Corydon, Mr. Ronalds, to the pinnacle of telegraphic fame, though he *did* depend upon the Admiralty, whose patronage he sought, and at their first rebuff, "took his leave of the science of electricity."

The article, however, does earnest justice to Mr. Ronalds's modest merit, in which I fully concur; but it is *falsifying scientific history to call Mr. Ronalds the "original inventor" of the electric telegraph*, even though it be done on Mr. Wheatstone's testimony, whose object in giving it is thus stated by the "Saturday Review":—

"In a pamphlet, Mr. Cooke had asserted that he had himself separately invented the telegraph, and Mr. Wheatstone had replied by denying the claim, on the ground that in 1823 the principle had been '*developed completely and effectually*' by Mr. Ronalds." Menalcas had insisted on his exclusive right to the Calf, but Dametas" (baffled, after a twelve years' struggle to keep it to himself, had in despair) "set up a preferable title in an absent Corydon."

All those gentlemen are in the same category; each employed well-known means to effect his object, the object an electric telegraph being in itself an old idea. The clocks, the divergence of pith balls, and the firing of gunpowder by static electricity, were all old discoveries long before Mr. Ronalds's time, as the magnetic needle, the galvanometer or multiplier, the voltaic magnet, and the decomposition of water were all discovered before Wheatstone or Cooke entered the field; and, not to go back to the mysterious "M. of Renfrew, who lived a century ago," Sømmering takes the lead in our time:—

"On the 5th of July, 1809," Dr. Hamel relates, in Dr. Sømmering's words, "the Minister (of Bavaria) wishes to get from the Academy proposals for telegraphs. I at once resolved to try whether the visible evolution of gases from the decomposition of water by the action of the galvanic current might not be applied to telegraphic purposes. I could not rest till I realized the idea. On the 22nd July, my apparatus was already so far advanced that it was fit to work." Dr. Hamel continues;—"On the 18th August, Dr. Sømmering could telegraph through as much as 2,000 Prussian feet of wire. On the 29th August, he exhibited his telegraph in action before a meeting of the Academy of Science at Munich. Here he expressed the hope that it might serve to telegraph from Munich to Augsburg, nay from one end of the kingdom to the other, without intermediate stations."

Every tyro in electrical history and science knows these facts.

Next to practical Sømmering came the practical Ronalds who proposed to use frictional electricity, and very fully elaborated his plans. Then Baron Schelling, and next Cooke and Wheatstone. Mr. Cooke's first idea of an electric telegraph has been recently taken up at its starting point, Heidelberg, and followed up to its realization in one of your late numbers. (See Extract xxi., p. 76).

I am about to handle the subject from a different point of view, and contrast with his scientific predecessors this Watt, Arkwright, or Stephenson, of telegraphy, who did not look to the patronage of Government for assistance, but fought his own way through all difficulties to success. It is in this respect that Mr. Cooke stands out in such strong

relief from the honourable band of telegraphic projectors that preceded him. He seized his idea where many hundreds of others might, if they could, have done the same, at a public lecture room. He sticks to it, never leaves it, works at it day and night in all its bearings, seeks scientific aid, obtains the protection of a patent, finds among the Stephensons, Brunels, and men of that class, minds that listen to his earnest representations and strong conviction, that the electric telegraph was a pressing necessity and a practicable reality. He laid down the line to Drayton, and eventually, at his own expense, extended it to Slough. He was the first to announce, from Windsor, at the "Times" office, (the "Times" admitted his notices to their columns gratis then,) the birth of the Princess Royal. By aid of the same telegraph Tawell was captured in the heart of the City; the great Iron Duke's forgotten dress suit was obtained from Apsley House in time for the Royal dinner party in the Windsor Banquet Hall. But such matters, though they amused the public for the moment as curious telegraphic feats, did but little to establish the telegraph as a public want.

This was in 1841, when the railway interests were at their lowest depression; no Act for any new line had been obtained during two sessions. Mr. Cooke, considering that the reduction of cost by establishing a system of single lines of rails, to be worked under the control of the electric telegraph, might give renewed life to railway and telegraphic enterprise, published a pamphlet, with illustrations, which has since been extensively republished abroad. George Stephenson and George Bidder adopted the plan. They obtained Acts for the Yarmouth and Norwich, the Brandon, the Northampton and Peterborough, and the Chester and Holyhead lines, (all single lines under the then Acts), to be worked by the aid of the telegraph. Railways revived, the Admiralty was roused; the late Lord Herbert, and other members of the Admiralty, visited Mr. Cooke at the Society of Arts, where all the instruments about to be fixed on the Yarmouth and Norwich lines were exhibited to them at work. They bargained, and bargained hard, for an electric telegraph to Portsmouth, but Cooke must find the capital, and incur the risk. The Semaphore cost the Government £2,000 per annum. They beat the luckless inventor down to £1,500; he resisted till the right was conceded to him to use the Government posts for suspending wires for a commercial telegraph. By this concession he gained the first links of his grand object,—a public telegraph to Southampton, which has since extended its great uniting chain over the world.

But whence was the capital to be obtained? Nothing daunted, he explained his difficulty to the South-Western Railway Directors, and induced them to furnish half the funds.

The line to Portsmouth was still incomplete when Her Majesty opened Parliament in person. Mr. Cooke, surrounded by a crowd of the Portsmouth authorities, accompanied by their ladies and friends, seated himself at the telegraphic instrument in the Gosport railway station, and read aloud the royal speech as it was telegraphed from London, whilst two printers at his elbow set the type in alternate sentences. Armed with copies of the speech, thus printed, he hurried up by the next train to London, and visited the editors of some of the morning papers, several of whom proclaimed the triumph of the telegraph the following morning. From that time the electric telegraph went alone.

His hair should be getting grey now, but he seems to be under the influence of his youthful energy in his fight for his rights against long-established prejudice, and who will venture to predict that the prophecy of "Fair Play" (Extract vi.), in one of your recent numbers will not yet be fulfilled—that a day will come when he shall have a "Gazette" to himself?

In Mr. Cooke's letter in a recent number of "The Reader," he modestly ascribes his success to having taken the "tide at its flood" (Extract xxii., p. 80;) but I think I dare assert that the strong conviction of future success which settled down upon his mind on that memorable evening at Heidelberg, and which seems never for a moment to have deserted him through a struggle of several years, would, had it occurred in 1816 instead of 1836, have enabled him to master all difficulties. He would, as in his own time, have imparted his strong convictions to other sympathising minds, and, unaided by railways, have carried along the high roads an electric telegraph to the leading commercial cities of the kingdom.

I am, Sir,

Your obedient Servant,

MATTER-OF-FACT.

EXTRACT No. XXV.

"The Reader," January 5, 1867.

THE ELECTRIC TELEGRAPH.

Sir,—Your correspondent, "Matter-of-Fact," says, in a late number of "The Reader," the article on the electric telegraph in the "Saturday Review"—

"Does earnest justice to Mr. Ronalds' modest merit, but it is *falsifying scientific history* to call Mr. Ronalds the *original inventor* of the electric telegraph, even though it be done on Mr. Wheatstone's testimony, whose object in giving it is thus stated by the 'Saturday Review':—'In a pamphlet, Mr. Cooke had asserted that he had himself separately invented the telegraph, and Mr. Wheatstone had replied by denying the claim, on the ground that in 1823 the principle had been developed completely and effectually by Mr. Ronalds. Cooke had insisted on his exclusive right to the honour, but Wheatstone,' (baffled after a twelve years' struggle to keep it to himself, had in despair), 'set up a preferable title in Ronalds.'"

A new and distinctive *sub-variety* of the "Genus Professor" is neatly defined in the above extract, the *variety* itself having been first established, and named by Kingsley in his "Water-Babies":—

"Professor Pithmllnsprts was a worthy little old gentleman—a very wise man, indeed—he had only one fault, which cock-robins have likewise—when any

one else found a curious worm, he would hop round him, and peck him, and set up his tail, and bristle up his feathers, just as a cock-robin would, and declare that he found the worm first, and that it was his worm; and, if not, that then—it was not a worm at all,” or (in the new *sub-variety* just established), “*the worm belonged to somebody else.*”

Some may think they could prove that the Professor Ptthmlnsprts, of King’s College, belongs both to the *variety* and *sub-variety*; if so, the reviewer will lose the merit of his grand discovery; but he may appeal to the arbitration of Darwin, and if he gets the “award” in his favour, he will soon find out how much an Award is worth among his scientific protégées. However, the said Professor Ptthmlnsprts, of King’s College, has finally given his testimony that Mr. Ronalds “found the (telegraph) worm;” and very sorry Professor Ptthmlnsprts must be that he kept him out of the honour for so very very many years, during which Professor Ptthmlnsprts had it in his own keeping. It will be curious to see whether he gets possession of it again. I never bet, but I should like to know the “odds” that he will—not!

In your number of the 8th December, Mr. Cooke is very complimentary to Mr. Ronalds, but he does not (to change the figure) seem inclined to recognise Mr. Ronalds’ right to assume the shabbily-worn mantle (or should I say professor’s gown?), cast off by the Professor. No doubt the Professor has found it “a world too wide for his shrunk” shoulders, since his measure has been more accurately taken by some of your correspondents.

Let us be just to all sides.

The reviewer represents Mr. Cooke as claiming in his pamphlet more than his fair share of the “Telegraph-worm.” Now, if he has done so, he may deserve to lose the whole.

Mr Cooke, however, asserts that he has always limited his claims to the points which Sir I. Brunel and Professor Daniell awarded to him; that they are consistent with his claims prior to the arbitration; and with the (published) evidence laid before the arbitrators.

Which of the twain has made good his statement?

The award credits Mr. Cooke as being—

“*The originator of the undertaking,*” and with the right and title to “*stand alone,*” as “*having practically introduced and carried out the Electric Telegraph as a useful undertaking,*” but it only allows him to stand “*on a footing of equality with Professor Wheatstone for their existing inventions.*” The award also speaks of “*Mr. Cooke’s plans and instruments in April, 1836,*” and again of his being engaged “*in February, 1837, in completing a set of instruments for a railway tunnel.*” Award, xxviii. xxix.

It was then that his acquaintance with Professor Wheatstone commenced.

“For all that *appears on the face of the award*, (says the Saturday Reviewer), Mr. Cooke may never have seen a *Telegraph.*”

The "award" turns up its honest "face," and *two notices of Mr. Cooke's instruments appear there in reply*. The "award" *justly* enlarges upon Professor Wheatstone's "profound and successful researches" in electricity, which had prepared the way for the practical introduction of the electric telegraph; but it silently admits that in May, 1837, Professor Wheatstone had produced no telegraph, or, as the reviewer acutely suggests, "*Mr Wheatstone may never have contrived one.*"

This advised silence on the part of the arbitrators, in that cautiously-drawn document, the "Award," is very significant, when compared with the *evidence* in the published arbitration papers—there "*evidence*" explains "*silence.*"

Backed by the recognition of Cooke's "plans and instruments" in the award, Brunel and Daniell's decision that Cooke was not only the "originator," but also the "practical introducer and carrier-out of the electric telegraph as a useful undertaking," may lose its "unmeaning" character in the Saturday reviewer's eyes;—blunder men have recently discovered a *meaning* in the "award" that cannot eventually be undermined. The reviewer's futile assertion in favour of Mr. Ronalds is answered by himself—"Mr. Ronalds takes leave of the science at the first rebuff of the Admiralty, in 1816."

Mr. Ronalds is the last man to strut about in "cock-robin's," or in peacock's feathers. He does not need them. Mr. Cooke admits in your number cited above, that Mr. Ronalds *might* have been the practical originator of the telegraph, but he was not.

"Mr. Ronalds was before the tide—we were both practical men, but it was my good fortune to take the tide at its turn." I was "*his successor* in the labour, *at length successful*, of producing a working electric telegraph."

To revert for an instant to the opening extract, in which the Saturday reviewer states—"In a pamphlet, Mr. Cooke had asserted that he had himself separately invented the telegraph," &c.—I would ask, Is the reviewer quite sure it was Mr. Cooke's pamphlet, and *not Mr. Wheatstone's pamphlet* he had before him when he was quoting? At page 3 of the latter (or page 51 of Cooke's 1st vol., where the pamphlets are all printed together, with references), Professor Wheatstone writes—

"Mr. Cooke alleges that he was himself 'the originator of the practical electric telegraph.' It would be easy to show that this is inconsistent even with the former printed admissions of Mr. Cooke. It is inconsistent with his *written* admissions. In a letter of the 20th October, 1840, he had urged Mr. Wheatstone to put him in a right position with regard to their *joint* invention—not, indeed, as the original projector *and leading* inventor, *for that I do not ask or desire.*"

Thus abruptly halts a quotation, made expressly to fix *inconsistency* on Mr. Cooke's claims. Compare it with the same passage as it stands in the misquoted letter:—

"Not, indeed, as the original projector and leading inventor, for that I do not ask or desire, *but as the inventor equally and jointly with yourself, standing in point of merit upon precisely the same ground.*"

"The words printed in italics were overlooked by Mr. Wheatstone when selecting his quotation." Page 274, vol. i.

Is this a fair specimen of the *usual accuracy* with which scientific men of the "Genus Professor" quote private letters sixteen years after they are written? Proh pudor! Or is it only what the "cock-robin variety," venture to risk, on the chance of there being *no copy preserved*, to prove "that it was his worm?"

I am, yours, &c.,

ANTI-COCK-ROBINISM.

EXTRACT No. XXVI.

"*The Reader*," January 12th, 1867.

THE ELECTRIC TELEGRAPH.

Sir,—As an appeal to the public against the injustice of the Press Mr. W. Fothergill Cooke has simply reprinted his pamphlet of 1854. A short preface explains the cause of the appeal. The pamphlet advances very heavy charges against Professor Wheatstone.

In the first of these charges, Mr. Wheatstone is distinctly accused of misleading the writer of an article in the "Quarterly Review" for his own glorification, and to the serious injury of Mr. Cooke. This charge remains to be made good. But Mr. Cooke's reiterated assertion to the effect that "*he can, by written evidence in his possession, prove the article in question to have been 'prompted exclusively' by Professor Wheatstone,*" must be regarded as his gauntlet, cast down in challenge alike to the Professor and to the "Review." The challenge has been declined. Neither denial, nor justification, nor acknowledgment has ensued—

O'er Hexham's altar hung my glove;
But Tynedale, nor in tower, nor town,
Held champion, meet to take it down.

Another weighty charge is to the effect that Professor Wheatstone, having privately obtained a letter from his own arbitrator and private friend, Professor Daniell, falsified a legal judgment, by showing that letter, as the exposition of the "Award," and that by the clandestine use of that substitute, he, for his own advantage, committed a grave legal and moral offence.

Another charge relates to insinuations of a purely personal character, which are most completely refuted by Mr. Cooke in his pamphlet, and in his letter to Mr. Wheatstone which appeared in your number for the 10th November. (Extract xi.)

There are also complaints that the article in the "Quarterly" has so effectually hood-winked the public, that the "Times" and other papers refuse to admit into their columns any explanation from Mr. Cooke, or his friends, however widely their own

leading articles may have set aside the now well-known "Brunel award." As Cooke fixes on Wheatstone the head and front of the offence, these complaints may be passed by; especially as we have observed that the "Times" and other leading journals have since published the "Award," (*Cooke's tower of strength*), in the best of their advertising columns—journals cannot stultify their own "Leaders"—Cooke will, therefore, do right to consider that he has received the *amende honorable* from the Press.

His pamphlet of December, 1854, establishes a very strong case, and it has not been in any way shaken by anything which has since appeared. Wheatstone's "Answer," (published more than twelve months after, viz., January, 1856), was utterly shattered within two months by Cooke's "Reply," (published in March of the same year), and by the reprint of the original arbitration papers, by which the "Reply" was accompanied. The two imperial octavo volumes, in which the whole of these documents is comprised, have indeed a formidable aspect; but the reader's path through them is made easy by abundance of clear marginal references; by these, whatever relates to any point on either side of the question may be traced at a glance, and all the documents being at once collated, each point is mastered as it occurs. A few instances would probably suffice to form a judgment as to the value of the "Answer." Let anyone, for example, take Wheatstone's misquotation from a letter noticed in your last number (Pamphlet, p. 66), or the claims to priority (vol. i., p. 150), or the French translation of the "Award," by Moigno (vol. i., p. 149), or the amusing and graphic picture of Professor Daniell's astonishment on seeing the patent telegraphic apparatus of Cooke and Wheatstone at Euston Square (vol. i., p. 158), or the exposure of Wheatstone's covert use of Professor Daniell's private letter (vol. i., p. 164 *et seq.*), and he will, I think, agree with me that the pamphlet of 1854 has not been shaken. Before leaving Wheatstone's "Answer," I think it only fair to suggest, that it was written *for* him, from his own memoranda and letters, and not *by* him. It is cleverly, but carelessly—nay, most recklessly—compiled. Wheatstone never would have published such egregious mis-statements with his signature attached. In illustration, see the lamentable confusion, and painful exposure, of his intended experiment *under the Thames* (Pamphlet, p. 58, and vol. ii., p. 131), on which shattered foundation he rebuilds his "Chateau en Espagne" (vol. i., p. 129), and claims to be the originator of the Atlantic and all other submarine telegraphs. This "Answer" commences thus:—"In undertaking to reply, Mr. Wheatstone must disclaim" (let me suggest in continuance the following words)—"all responsibility for this pamphlet."

The strength of Mr. Cooke's case lies—in his definitively accepting the Award of 1841 as a limit to his claims; in his frank admission, that he was himself unskilled in electric science in 1837; in his no less frank admission of Wheatstone's electric researches; in the steady consistence of his claims, before, during, and since the arbitration; and in his always writing *manfully for himself with his signature attached*.

The parts of his case most heavily pressing upon Wheatstone are—the very serious charge against him of tampering with the Press; the obtaining, and clandestinely using, his own arbitrator's *private* letter; and the substitution, on the continent, of another document in place of the "Award."

The "Quarterly Review" affair has its double bearing; but I may leave the "Quar-

terly" to sail serenely on, in its pride of place; or, to vindicate its fair fame, as a reliable guide in scientific history—as it pleases.

In conclusion, I will, with permission, address a few words of advice, through your columns, to Professor Wheatstone, as to the manner in which he may extricate himself from his present more than questionable position. I would say to him: Admit frankly, and promptly, any error made by yourself, or by your friends on your behalf. Deny explicitly, *if you can*, Cooke's charge respecting the "Quarterly," (it is the most damaging charge against you; amounting to no less than this, that you have robbed another of his rights, for your own sole benefit). Throw the responsibility of that article on the right man, and *demand Cooke's proofs*. But be *careful* that you are not trapped in any pitfall! You, and the well-known writer, can best judge if there be danger. If you can thus remove "the winter of our discontents," demand, *as Professor Henry did in America*, an open enquiry before high-minded independent men; not before old scientific friends, either at King's College or elsewhere—that would but excite the more suspicion, as savouring of a desire rather to conceal the truth than to exhibit it. It is no question of your scientific researches or talents; no one doubts or questions those; it is whether you have availed yourself of your direct or indirect influence with the Press, and with literary men, to deprive "a comparatively unknown colleague" of his honourable share in the introduction of the electric telegraph, for *your exclusive honour and glory*. It may be a painful ordeal for you to go through, yet Professor Henry voluntarily submitted to it, and came out with honour.

Follow his example, *if you dare*. *Mens conscia recti* need have no hesitation. After all, is the ordeal so painful as that through which you have forced Mr. Cooke to pass? Refer to his letter of the 6th November (you will find it in No. 202 of "The Reader"), begin with the words "In 1854, I fixed you as a party to insinuations then current," and read, with the feeling and conscience of a gentleman, down to—"if you continue to be dissatisfied, pray make me acquainted with the grounds of your dissatisfaction." His concluding words are also worthy of your attention:—

"There is no escape from this dilemma, and though it is now, as I long since warned you it one day would be, beyond your power to do me justice without dishonour to yourself, a frank confession of your error will attach to your well-known name a less enduring stigma."

I think, Mr. Editor, that the above advice is sufficient for the *present* occasion; but, if it be thrown away, I may again ask admission to "The Reader" for more facts, unaccompanied by advice, to the Professor. Mr. Cooke, ensconced in the wilds of North Wales, may take this question quietly, *but his friends are resolved to bring it to an issue, and they all feel deeply indebted to you for opening your columns to the discussion.*"

I am, Sir, your obedient Servant,

AMICUS.

EXTRACT No. XXVII.

“*The Spectator*”—*Editorial Review*—January 19, 1867.

WHO “INVENTED” THE ELECTRIC TELEGRAPH?†

The first requisite to a sound decision of any question is that its terms be well defined. In order to decide who “invented” the Electric Telegraph, we must set out with something like a distinct notion of what we mean by its “invention.” All whose concern with patents has ever made them acquainted with the claims of rival “inventors,” know that the name of that *genus irritabile* is legion. When we attempt to trace back to their historical origin such inventions as the steam engine, steam navigation, steam railway locomotion, or photography, or electric telegraphy, we find it, in each instance, difficult or impossible to assign to any one man exclusive paternity of the original idea of any one of those inventions, or even undisputed priority in putting the principles involved in them to the test of practical experiment and actual application.

Why are the names of the pioneers of railway locomotion consigned to the background of the history of applied mechanical science, and why does George Stephenson’s *ultimate practical embodiment of the previous results of the inventive faculty of other men*, who had probably more of that faculty than himself, *bear off all the honours of the invention of steam locomotion* from all his precursors and all his competitors in that long laboured field? Simply because George Stephenson *was the first to work out the problem of steam locomotion to successful practical purpose, and raise it from a toy or hobby to a thing of use*. It was in the power of persevering development and practical adaptation that he excelled all his clever precursors and competitors; and *it was the accomplished result, not the original conception of that result* as attainable, nor even the exhibition of the first specimens of its partial attainment, which identified his name for all future time with the honour of that invention.

Five and twenty years back, the question was referred by Messrs. Cooke and Wheatstone to the arbitration of the late Sir Isambard Brunel and Professor Daniell—in what proportions was to be attributed to each of them the merit of the invention of the Electric Telegraph, of which they were joint patentees in this country. The gentlemen referred to *gave a well-weighed award*, which both the parties *professed* to consider satisfactory, and which concluded as follows:—

“Whilst Mr. Cooke is entitled to stand alone as the gentleman to whom this country is indebted for having practically introduced and carried out the Electric Telegraph as a useful undertaking, promising to be a work of national importance, and Professor Wheatstone is acknowledged as the

† The Electric Telegraph: Was it Invented by Professor Wheatstone? By William Fothergill Cooke, Esq. 1868. Third Thousand.

scientific man whose profound and successful researches had already prepared the public to receive it as a project capable of practical application, it is to the united labours of two gentlemen, so well qualified for mutual assistance, that we must attribute the rapid progress which this important invention has made during the five years since they have been associated."

As Professor Wheatstone has naturally had all the advantage on his side of that controversy, *which could be derived from scientific sympathies*, (that we may not say *camaraderies*), at home and abroad, and as to have been previously known in the world of science no less naturally drew after it the prevalent disposition in scientific circles to ascribe to him the lion's share of merit in any joint achievement wherein science was concerned, Mr. Cooke is the party who has felt aggrieved by the monopoly of honours for the invention of the Electric Telegraph, persistently claimed by, and frequently taken for granted as exclusively due to, his late scientific colleague. We confess the merits of the case seem to us to lie in a nut-shell, as soon as it is stated with the precision indispensable in all such cases. We should be disposed to follow the eminent electrician, Mr. Varley, who lately addressed a letter to our weekly contemporary the *Reader* on the subject, in substituting for the question,—who invented the Electric Telegraph? the question,—*who introduced it as applicable to practical use?*

Assuredly, neither Professor Wheatstone nor Mr. Cooke can lay claim to the honours of the original invention of electric telegraphy, and we may borrow, as the most concise we have met with, Mr. Varley's enumeration of their scientific precursors:—

"As each property of Electricity became known, its velocity being popularly considered instantaneous, it immediately suggested the idea of its application for rapid communication to a distance. Telegraphs were actually made and worked from one room to another, by means of static electricity, as far back as the last century, but the first person who proposed a telegraph worked by the voltaic battery, and *who realised it*, was Sømmering."—(This extract from No. xiv., p. 69, is continued at length, closing with the paragraph,)—

"It will, therefore, be seen that telegraphs were not only constructed, exhibited, and worked at a very early date by scientific men, but that Sømmering had even proposed and exhibited his telegraph in 1809, which he described could be worked 'by night, as well as by day.' In a word, the *inventors of the electric telegraph are legion.*"

One more inventor, before themselves, of electric telegraphy has received due honour from Messrs. Cooke and Wheatstone, and has received some passing notice in our own columns—Mr. Ronalds. "In 1823," says Mr. Cooke, in the preface to the first edition of the pamphlet now before us,

"Mr. Francis Ronalds, a gentleman well known in the scientific world, published his *Descriptions of an Electric Telegraph, and of some other Electrical Apparatus*, a work of originality and merit, although, as Mr. Ronalds pro-

posed to work by frictional electricity, through a wire enclosed in a glass tube, his telegraph was not adapted for practical use."

In 1836 Mr. Cooke, then a young man pursuing anatomical studies at Heidelberg, saw there for the first time a telegraph model at work—that of Baron Schelling—and foreseeing at once the great advantage that would result from its practical application in the then infant railway system of this country, set himself strenuously to put that idea into working shape.

"So diligently" (says Mr. Varley,) "did he pursue this object, that within twelve months, he had invented a telegraph suited for practical use."

"It was Mr. Cooke who first applied the attraction produced by voltaic electricity to the descent of a clock train, to control its motion, or to ring a bell—an important step in practical telegraphy." (This extract from No. xiv. is continued to the paragraph,) "In 1837 Cooke and Wheatstone took out their first patent; and the Electric Telegraph shortly afterwards, thanks to Mr. Cooke's enthusiasm and energy, took root and spread over the length and breadth of the land."

The whole matter of controversy between Mr. Cooke, the practical projector, and Professor Wheatstone, the scientific coadjutor, in the great work of the introduction of the electric telegraph into Europe, appears to us, as we have already said, to lie in a nutshell.

That the controversy still appears to remain unsettled seems to us to arise less from any distinctly stated dispute of facts, than from some want of distinctness in estimating the weight to be attached to facts undisputed. From the very fact that the two first patentees of electric telegraphy in England, Messrs. Cooke and Wheatstone, (we place the names in the same order as they stand in the patent,) found occasion to associate themselves together to carry out the invention, it appears to us out of the question that either of them should assert a just claim to its sole merit. Professor Wheatstone must have been qualified to bring to bear upon it scientific principles and experiments which Mr. Cooke could not supply single-handed, or the latter had no conceivable motive for seeking him as a partner in his undertaking. On the other hand, *that undertaking must already have assumed a substantive shape, and must have presented itself with "a provoking probability of success,"* as Sir Anthony Absolute says, or Professor Wheatstone would have had just as little motive for partnership with Mr. Cooke. We must suppose Professor Wheatstone's skilled scientific co-operation to have been highly important to the speedy successful carrying out of the practical enterprise first started in that shape by Mr. Cooke, but we cannot suppose the "*energetic nature and shaping mind*" of the latter to have had less of motive force in the detailed conduct of the enterprise, than they undoubtedly had in the first determined pursuit of it as a practical enterprise at all.

"Many philosophers," says Mr. Varley, with truth, "have invented electric

telegraphs; many had foreseen their great use; *but the one man of indomitable energy, perseverance and foresight, who took the matter up and forced the public into its recognition, is undoubtedly William Fothergill Cooke."*

EXTRACT No. XXVIII.

"*Engineering*"—Review—February 15th, 1867.

THE ELECTRIC TELEGRAPH, BY ROBERT SABINE.

We cannot go with the Author when he says, p. 36,—

"The history of the subject so far shows us that no single individual can claim the distinction of being the Inventor of the Electric Telegraph, but if there is one worker who deserves more credit than another for his energy, diligence, and success, in the service of his adopted science, that man is certainly Professor Steinheil." (While subsequently he says, p. 40;)—

"It was once a popular fallacy in England and elsewhere, that Messrs. Cooke and Wheatstone were the original inventors of the Electric Telegraph. The Electric Telegraph has, properly speaking, no inventor; it grew up little by little, each inventor adding his little to advance it towards perfection. Messrs. Cooke and Wheatstone were, however, the first who established a telegraph for practical purposes, comparatively on a large scale, and in which the public were more nearly concerned than in those experiments in which the ends of the wires were brought into laboratories and observatories. Therefore it was that the names of these enterprising and talented inventors came to the public ear, while those of Ampère and Steinheil remained comparatively unknown."

And, we may add, therefore they will continue to remain so; *for the power that both germinates and matures great discoveries—the indomitable energy that overrides every obstacle—the determined perseverance that is not beaten by failure, or does not succumb to ill-success—the pluck that for years and years battled against popular incredulity—surely deserves greater notoriety than the mere philosophical schemer and experimenter.*

Steinheil undoubtedly did much to raise the edifice, and his discovery of the use of the earth as a part of the circuit is enough of itself to establish his fame; but he cannot be placed by the side of Cooke, who, far more even than Wheatstone, *deserves the title of the father of the Electric Telegraph, and who will assuredly ever maintain the première niche* in the roll of scientific and mechanical benefactors of the human race.

We do not claim for Cooke the invention of the Electric Telegraph *per se*, any more than we claim for Watt the invention of the steam engine, or for George Stephenson the invention of railways; but we do claim for him, jointly with Professor Wheatstone, the

invention of a telegraph which was a practical instrument, and not a philosophical toy ; and we claim for him *alone*, the position of being the one to whom, before all others, the world is indebted for having practically introduced and carried out the electric telegraph as a useful undertaking, which has proved itself to be a work of universal grandeur and importance.

Russia may have her Schelling, Germany her Steinheil, America her Morse, but they must all yield actual priority of practical construction and public use to William Fothergill Cooke.

[Other "notices" of the Controversy have appeared in Journals during the last few months, but the foregoing alone have come under my own observation. March, 1867.

THE ARTICLES, CORRESPONDENCE, &c., FROM WHICH EXTRACTS v.—xxviii. ARE TAKEN, WERE WRITTEN IN ANSWER TO LEADING ARTICLES IN THE TIMES, DEMANDING NATIONAL HONOURS FOR PROFESSOR WHEATSTONE EXCLUSIVELY, AS THE SOLE MERITORIOUS AUTHOR OF THE ELECTRIC TELEGRAPH. SEE EXTRACTS i.—iv. NO REPLY HAS EVER BEEN ATTEMPTED TO ANY ONE OF THOSE PUBLISHED DOCUMENTS.

IT IS CLEARLY THE OPINION OF MR. COOKE'S SOLICITOR THAT THIS FACT, ESPECIALLY AS RELATING TO MR. COOKE'S LETTER TO PROFESSOR WHEATSTONE, EXTRACT xi., p. 63, AND TO THE EMPHATIC ENUNCIATION OF THE INFERENCE TO BE DRAWN FROM THAT LETTER BEING LEFT WITHOUT REPLY, EXTRACT xix., p. 75, IS EQUIVALENT TO A SECOND AWARD IN MR. COOKE'S FAVOUR. THIS SECOND AWARD HAS NOW BEEN FURTHER CONFIRMED BY THE AUTHORITATIVE RE-ASSERTION OF MR. COOKE'S PRIORITY OF POSITION BY THE AWARD OF THE ALBERT GOLD MEDAL OF THE SOCIETY OF ARTS. December, 1867. ED.]

APPENDIX B.

THE PAMPHLET, OR "SKETCH," OF 1836.

FORESIGHT: "PLANS AND INSTRUMENTS."

In his Case, laid before the Arbitrators in 1841, my brother thus relates his first effort to establish his Telegraphic System on a Railway :—

"Towards the end of 1836, my Mechanical Instrument was nearly completed, and my funds nearly exhausted. Finding it, therefore, necessary either to turn my invention to an immediate profitable result, or to draw upon the resources of my friends, and preferring the former alternative, I obtained an introduction to several of the leading gentlemen connected with the Liverpool and Manchester Railway, and submitted to them, in January, 1837, my PAMPHLET, (or "SKETCH,") and my MECHANICAL INSTRUMENT, with a view to the practical adoption of the telegraph in a tunnel, for which some mode of conveying signals was required. The correspondence connected with this, my first endeavour to apply the Electric Telegraph to Railways, will be laid before the Arbitrators.

"Before taking my Instrument into the north, I showed it, in November, 1836, to Dr. Faraday, who kindly called at my lodgings in the Adelphi for the purpose of looking at it, and encouraged me by an assurance that I was right in principle.

"The Directors of the Railway Company thought my instrument, which was calculated to give sixty signals, too complex for the purpose of conveying a few signals along a tunnel, and, therefore, proposed that I should arrange one adapted for their purpose. I immediately designed and drew the second form of the Mechanical Telegraph, which was based upon the same principles as the first, but being calculated to give fewer signals was less complex. I returned to London immediately afterwards, and directed four instruments of the simpler form to be begun; which were soon afterwards made, and are extant. I had two of them working together at the close of April, 1837." Vol. ii., pp. 22, 23.

In his Pamphlet of 1854, my brother says ;—

"The correspondence with the Directors of the Liverpool and Manchester Railway included a letter from Dr. Reynolds of Liverpool, which I print as a contemporaneous expression by a scientific man, of the general state of opinion as late as January, 1837, (many years after the commencement of Mr. Wheatstone's experiments,) on the subject of telegraphing by electricity. The letter runs thus : †—

† In Dr. Reynolds' letter I have italicised certain parts, to which attention is subsequently drawn. En.

“My dear Sir,—I have examined the papers, (my brother's Pamphlet, or “SKETCH,” of 1836,) which you sent to me describing the Electro-Magnetic Telegraph. The Author does not explain the mode in which he proposes to apply this power to effect his purpose. There can be no doubt that electricity, from whatever source it may have been derived, can be transmitted to a distance, however great, by means of a copper wire, in a space of time almost imperceptible. Mr. Wheatstone calculates that it travels at the rate of four million feet in a second. Supposing, therefore, that an isolated wire were extended from Liverpool to London, we might transmit electricity from one place to the other with the greatest rapidity and regularity; *but how this power or agency can be applied to communicate signals to the extent required, I cannot conceive*; and on this point Mr. Cooke is silent, no doubt intentionally, as in this evidently consists *the essence of the invention*, and he very naturally must wish to secure some advantage from his discovery, before making it public. *He appears to have bestowed much thought and labour on the subject; and some of his contrivances are very ingenious. I was particularly struck with his mode of detecting the defective place, should the wire be broken in any part—it is for this purpose that he makes use of the index or dial, (the “Detector,”) given in his book. He appears to me, however, to underrate the practical difficulties of maintaining a wire extending for many hundred miles, in a state of perfect integrity and electrical isolation. And unless he has two wires of communication, he would, I conceive, be liable to the inconvenience of the parties at each extremity signalling at the same moment of time, and the effect being thus destroyed.*

“I am, my dear Sir,

“Very truly yours,

“WM. M. REYNOLDS.

“Bedford Street, 26th January, 1837.

“Jos. N. Walker, Esq., Calderstone.’” (Vol. i., pp. 31, 32, *note*.)

My brother's “SKETCH OF 1836,” which forms the subject of Dr. Reynolds's letter, just quoted, is entitled thus:—

“PLANS for Establishing on the most Extensive Scale, and at trifling expense, a rapid Telegraphic Communication for Political, Commercial, and Private Purposes, especially in connexion with the extended lines of Railroads now in progress, between the principal Cities of the kingdom, through the means of Electro-Magnetism, by W. F. C.”

I proceed to extract the leading points of this “SKETCH,” written 31 years ago.

“The inventor of the Instrument and System, which are the subjects of the following pages, has availed himself of an idea, suggested many years ago, that the amazing rapidity with which a suspended magnetic needle obeys the impulse of a galvanic current, conveyed along a great length of wire, adapted it for telegraphic purposes. The apparatus, hereafter mentioned, is worked on a different principle altogether, the galvanic agency being, however, still employed,

"The national importance of some practicable method, by which the benefits of a rapid telegraphic communication may be extended at a cheap rate to political and mercantile affairs, and in all cases of emergency, to the private concerns of individuals, is obvious; and it seems only to be needful that a clear statement should be given of the manner in which this object may be attained, to ensure general encouragement and support for the execution.

"Improvement, however, which in every other department, involving the convenience and exigencies of society, has, especially of late years, made the most rapid and unexampled progress, we find inactive here.

"The enormous expense of the present system, is felt even by Government, in the short line between London and Portsmouth, the solitary instance in which it has been called into action, even in affairs of state.

"This expensive system labours under the following imperfections, which admit of no remedy.

"I. The SEMAPHORE is only available during daylight.

"II. Even by day it is interfered with in its action by partial rains, storms, morning and evening mists, and by the dense fogs of winter, for weeks together.

"III. The utmost vigilance is constantly required at each station; and a degree of brevity, often objectionable, must be observed in the despatches.

"IV. The symbols are publicly displayed, and their meaning is liable to detection.

"The system here advanced, causing expense so small as to bear no comparison with that now incurred, and effectually supplying the deficiencies, and avoiding the imperfections above mentioned, offers advantages to the public, as well as to the Government, which it is hoped are not unworthy of consideration. The Electro-Magnetic Telegraph, which the writer has invented for this purpose, is small, compact, and portable, yet very strong in its construction, and is unaffected in its action by darkness, or any obstacles of the atmosphere; the first signal being an alarum, which continues its call at intervals till answered, demands no vigilance: its action at any number of connected towns,† stretching from one end of the kingdom to the other, may be considered as simultaneous, since the electric fluid traverses many hundred miles in a time too short to be appreciated: it ensures correctness in the notices given, being so arranged, that each signal to be represented to others, is, at the same instant, presented to the eye of the signalizer; it precludes the possibility of any but confidential clerks seeing the symbols given; to which, when requisite, they would have no key. Lastly, as an advantage peculiar to itself, this instrument, by the instantaneous transmission of notices, sets the most broken dialogue on the same footing with a single despatch. Though not impracticable before, it may perhaps be said that by this system, telegraphic dialogue is introduced.

† "Any number of instruments may be attached to the same conducting wires. Hence, if telegraphic intercourse is to be established between two distant places, the wire, laid down for this purpose, may be connected with an instrument at every town which it visits throughout its course. In such combinations, whatever symbol is represented on any one instrument, immediately presents itself on all the rest." *This note is attached to the original Sketch.*—Ed.

"For the execution of this plan, the only requisites are, that one of these instruments be kept at each of any number of towns, between which intercourse is to be carried on, and that two copper wires, properly defended,† be laid in the earth along the intervening line of road, by which the instruments may be connected with each other, and the telegraphic notices conveyed. Admitting the capability of the instrument, and the correctness of the principle, yet two apparent difficulties in the execution of the project, will naturally suggest themselves to the reader, viz. :—

"1st.—The liability of small copper wires, extending for many hundred miles, to receive injury ; and,

"2ndly.—The difficulty of determining the place, where such injury has been received.

"Since any serious inconvenience here would, indeed, form a weighty objection against the system, it may be as well to consider how these difficulties may be effectually obviated, before proceeding further. Injury to the wires may result either from—

"I., A gradual decomposition of the metal ;

"II., A fracture, owing to a partial settling of the ground ; or,

"III., External violence—either accidental or designed.

"I. Copper, as is proved by the perfect state of ancient coins, which have lain buried for ages, is subject to very slow decay ; and the protecting trough, already described, by guarding the wires from moisture and air, would effectually preserve them. (Liabilities II. and III. are then examined.)

"To proceed to the second subject of consideration proposed ; viz., the providing a sure, speedy, and simple, method of discovering the injured point in every case.

"For this purpose branches will be given off from the main wires, opposite to turn-pikes upon common roads, and to station-houses on railroads, in which buildings the extremities of the wires will be secured. When an injury has occurred, the District Inspector will there test the wires, in the manner described in the note, with a simple electro-magnetic instrument containing a poised magnetic needle.‡ Knowing that the

† "The following plan for the construction of a conducting trough, is recommended by the Projector, as the cheapest and most durable, which has occurred to him ; offering, at the same time, an effectual mode of isolating the wires, and of protecting them from decomposition. He proposes that the wires be laid in separate channels, formed along the surface of narrow slips of baked wood, and covered in with a thin lath of the same material ; and that this case be inserted into a trough of thick semicircular draining tiles, about three or four inches in diameter, the space between the wood and tile being filled with water-proof cement. The whole may be guarded above by a flat tile, and buried from eighteen inches to two feet in the ground. Through large towns, where the streets are frequently disturbed for the laying of gas or water pipes, iron pipes (the wires being isolated by wood), might be preferable." *Attached to the original Sketch.*—ED.

"The wires from Euston Square to Camden Town, were laid down on this principle in January, 1838. About four years ago, our electrician and his workmen found many yards of it ; the wood was quite sound, and the wires still insulated. They called it the 'Fossil Telegraph ;' and showed it to me as a curiosity, not knowing its date or history. A piece of this 'Fossil Telegraph' may be seen in the Board-room of the Electric Telegraph Company in Moorgate Street. It now dates back thirty years, and had been underground about twenty-six years." *Private letter from my brother, 1867.*—ED.

injured part is to be found between the two stations, at which the effect on the needle is reversed, he will test the main wires in the trough at the middle point between those stations, thus halving the uncertain distance. When this operation is repeated twelve times, a distance of twelve miles will be reduced to five yards. This ready method of detecting injury forbids the liability being viewed as an objection to the system.

"We proceed to notice further advantages.—

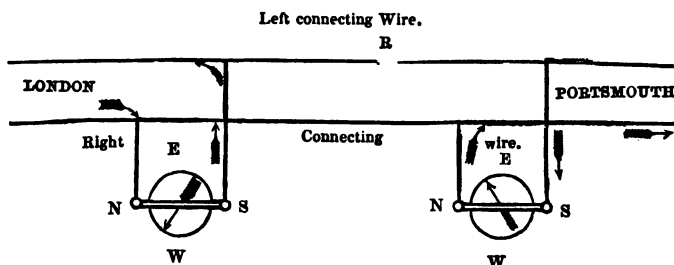
"1st. From the nature of the Instrument.

"2ndly. From its extended utility.

"Hitherto *signals*, very slightly differing from each other, have been used in telegraphing to represent, either the letters of the alphabet, or numbers corresponding with the signal-key. In the Electro-Magnetic Telegraph the characters represented amount, as already stated, to 60; viz., 22 letters, the Arabic and Roman numerals, 14 symbols, the Government and private symbols, &c. Of these from 1000 to 1500 may be represented in an hour.†

"The precision and certainty of the Instrument are also deserving of observation. It is worked in a very simple manner by sixteen keys or stops; each of these keys has the particular characters inscribed upon it, which the Instrument can be made to represent

‡ "This instrument we will call a 'Detector.' It resembles a small pocket compass (E W in the subjoined diagram,) with a coil of copper wire across the dial, terminating at its extremities N S, in cups of mercury. It is adjusted, when used, to the magnetic meridian, so that the needle is parallel to the coil. If a current of positive electricity be passed along the wire in the direction N S, the north pole of the needle will be deflected towards the west; if in the opposite direction, towards the east. Let L P be two places, between which the connexion has been broken at some point R. The Telegraphic Instru.



ments at both places are so arranged, that the positive currents tend to flow in the direction of the arrows. When the Detector is applied to the branch wires, it completes the galvanic circuit with the Instrument at L, or with that at P, according to the side of R, on which the experiment is made. As the right and left branch wires from L are placed in connexion with the north and south cups of the Detector, respectively, so long as experiments are made between L and R, the deviation of the north pole of the needle will be westerly, and it will become easterly on the other side of R, indicating the direction of the injury." Attached to the original Sketch. Ed.

† It is the first Mechanical Telegraph, delineated in Drawing III., vol. ii., which is here described. When smaller Instruments were required for the Liverpool and Manchester tunnel, this Instrument was left under the care of Dr. Reynolds at the Liverpool Institute. From thence it was sent for to London, in 1840, and taken direct to Professor Wheatstone's house, in Conduit Street, before the patent for the Mechanical Telegraph was taken out. Ed.

by its action; and these characters are arranged in such positions as to indicate the direction in which the key must be moved for the representation of each. The greatest possible security is thus afforded that the attentive signalizer will without fail represent the character, which he intends. Only one character is visible at a time. And this one character being simultaneously represented on both Instruments, if the signalizer have laid his hand upon a wrong key, he immediately observes his error, and will correct it by the following signal.

"Inscrutable secrecy is obviously of primary importance in the mass of telegraphic correspondence. This may, on a *primâ facie* view, appear difficult to obtain, where the symbols are seen by a number of persons at the same time, without each corresponding party having a private signal-book; but the accompanying "Round Robin" cypher * will at once show, from the innumerable changes, of which it is capable, that a published signal-book may be employed on the most private occasions. These changes depend upon the fresh relative arrangement of the circle containing the letters to that containing the figures, each time of the cypher being employed, however frequently it may be required during the day.

"To illustrate this, suppose a card published with each signal-key, with the letters and numbers in the order of the annexed cypher. A London banker in the habit of communicating on extraordinary occasions with his country agents by Telegraph, would furnish each of them with a private memorandum, of which he would keep a copy, to this effect. (The use of the cypher-card is here explained at length; the setting of the cypher being capable of systematic and "endless variation" by the days of the month, &c., to which the most extensive correspondence would give no clue.) At first it may appear difficult to transpose from the cypher-card, but a very little practice gives great facility.

"We proceed to consider the application of this system to the affairs of Government, of the commercial world, and of the private individual.

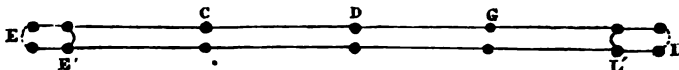
"I. Application to the affairs of Government.†

"The Electro-Magnetic Telegraph gives great facility for the exercise of Government control in cases of emergency, without interfering with the public enjoyment of its fullest advantages on ordinary occasions.

* "This cypher has been lost." *This note was attached, when the Arbitration Papers were re-printed in 1856. See Vol. II., p. 248. Ed.*

† "In Government business the delay occasioned by transposing the signals might be avoided, and further advantages be secured when the despatches passed through confidential hands only, by having a distinct apparatus, secured from access by lock and key, (this arrangement is still carried out at the Lothbury, and, I believe, at the Strand offices—Ed.) in connexion with the general line of wires. In this distinct apparatus the order of the symbols might be differently arranged; so that the signals represented on the other Instruments, through which the communication passed, when the Government instrument was working, could have no connexion with the sense of the Government despatch, which would nevertheless be expressed in the ordinary numbers, and in reference to the published signal. If any further precaution were required, a signal-book differently numbered, or a supplement to the published one, containing names, important expressions, such as 'war,' 'riot,' 'military,' &c., might be used for further security; or a trifling periodic change in the arrangement of the symbols, requiring only a minute or two for adjustment, would baffle the most skillful decypherer." *Attached to the original Sketch. Ed.*

"If E, L, and E', L', be the public and Government Instruments at Edinburgh and London respectively, and C, D, G, Instruments at intervening towns, the connection between E and E', and between L and L', can be immediately broken off; and, if the



public and Government Instruments be differently arranged, the signals will be unintelligible at C, D, and G. Where Government despatches are most frequent, separate wires might be appropriated to their use. If, in this case, the public wires were made to pass through the Government office, Government could assume exclusive control, when, either their own purposes, or the avoiding of popular excitement, might render it necessary.

"II. Application to commercial affairs.

"The advantages under this head are no less comprehensive and important. An immediate knowledge of the daily state of all the important markets, &c., would place the most distant cities of the kingdom on a footing in their mercantile transactions with the capital. The daily state of the money market so eagerly expected on the stock exchange of London, would be looked for with equal anxiety at Liverpool, Glasgow, and Newcastle, at the same moment.†

"The capitalist of Glasgow might, without fear of an unfavourable change of price taking place in the interval, transmit to his agent in London orders for the immediate sale or purchase of stock or shares; and the banker of the country, when pressed in time of panic, might be preserved from stopping payment, by assurance from the capital of extended credit. The offerer of false bills, on the other hand, would be in more dangerous circumstances, when his guilt might so soon be proved; and the culprit, escaping from justice,‡ might be anticipated by intimation to the authorities on the coast.

"For security against unfair dealing and neglect, copies of all communications, given in for transmission at the office, would be kept for the reference of subscribers, with date of the day and hour, at which they were received and forwarded; and the originals, countersigned as entered, would be returned. Where unjustifiable delay, or carelessness, in forwarding the same was proved, the clerk would be subjected to punishment. This, and other obvious regulations, would ensure the same accuracy in the Telegraph, which has established the character of the Post Office.

† "The periodic announcement of this, and other great markets, would occupy but little time; for, by allotting to certain important intelligence of frequent occurrence the lower numbers, (say from 10 to 99, which require only two signals to express them, and which would be readily recognized in practice,) on the expected signal appearing about the usual time, the clerk would take a printed form, and fill up the blanks, as the signals appeared. The order in the details of each report would be uniformly observed, as they would be given from a similar printed form, filled up by a responsible person.

"The day's report of the Stock Exchange would run as follows:—(not filled in in the original.)"
Attached to the original Sketch. Ed.

‡ The first "culprit escaping from justice" captured by the Electric Telegraph, was Tawell the murderer. *Ed.*

"III. Application to the affairs of individuals.

"The cases in which the convenience of individuals would be affected are innumerable; and perhaps there are few persons, however generally unconnected with the affairs of the busy world, who would not sometimes be spared, either a lengthened epistolary correspondence, or an expensive journey, by a few short communications through the Telegraph. The comfort of friends and relations, far distant from each other, would often be materially involved, especially in cases of sickness; and it may not be too much entering into detail to specify that particular instance, where sickness appears hastening towards a fatal termination with such rapidity, that a final meeting is without the range of ordinary means.† Though the application of the Telegraph to private affairs is less dazzling than that to Government and Commerce, it is perhaps not less intrinsically valuable, as equally tending towards the one and only justifiable object of all establishments—the aggregate of comfort and happiness to the nation. It may here be observed, that should it at any time be desirable for the Admiralty, in their communications with vessels lying off telegraph-ports, to convey their despatches direct during the night, the apparatus in ordinary use, conveniently situated facing the sea, may, by a peculiar adaptation of the hydro-oxide lime burner, arranged for this Instrument, extend their correspondence many miles across the water. (The SKETCH then describes the application of the Telegraph to the working of Inclines by assistant Engines. ED.)

"Lastly, consider the sources whence a revenue, adequate to defray the original outlay, and current expenditure, of such an enterprise may be derived. If a Company undertake the execution, under the control of Government, a proportionate remuneration for the forwarding of official despatches may be looked for from that quarter. In each town where a Telegraph was established, various classes of subscribers would be admitted to the privilege of receiving and forwarding their private correspondence, and of being made immediately acquainted with the general news of the day. (Details are here given on this head. ED.)

"If any interference, which an extensive establishment of the Telegraph might create with the Post Office, be viewed as an encroachment upon the revenues of Government, it will be remembered that communications by Telegraph may be taxed, as well as those by post; and as this interference would be almost insensible in any case, Government would gain, not lose, by the event.

"The writer does not propose to go into a lengthened statement of the minor details of his plan on the present occasion; but to give only such a *sketch* as will enable the reader to form a general idea of it as a whole.

"The duties of a clerk of the Telegraph would be extremely simple, requiring only accuracy and attention in noting down and transmitting notices; with a certain degree of expertness, easily attained, in working the Instrument.

"These qualifications are frequently possessed in a remarkable degree by a very deserving class of persons, to whom our state of society has hitherto assigned no congenial occupation.

"The deaf and dumb might, in the Telegraphic department, find employment peculiarly suited to their education and powers. Accustomed from their infancy to abbre-

† London Physicians are constantly consulted, and they prescribe, by Telegraph. ED.

viate as far as possible, by signs, their symbolic language, they would quickly attain a degree of conciseness in spelling, which, in addition to the omission of the smaller words, would enable them to transmit with astonishing rapidity a lengthened despatch; whilst a habit of attention, enforced by their infirmities, would be favourable to the accurate performance of their duties. A method, as effectual as the Alarum for those who can hear, may be employed in connexion with this Instrument, to awaken the deaf from the soundest sleep.

"What the introduction of this system may eventually lead to, the writer does not venture to predict; but concludes these remarks with a quotation from Dr. Lardner's work on the Steam Engine, a passage, which may be no less forcibly applied to the action of the Electro-Magnetic Telegraph; and, indeed, corresponds most happily with the united action of both. It runs thus:—

"The moral and political consequences of so great a change in the powers of transition of persons and intelligence from place to place are not easily calculated. The two advantages of increased cheapness and speed, besides extending the amount of existing traffic, call into existence new objects of commercial intercourse. The concentration of mind and exertion, which a great metropolis always exhibits, will be extended in a considerable degree to the whole realm. The same effect will be produced, as if all distances were lessened in the proportion, in which the speed and cheapness of transit are increased. Towns, at present removed some stages from the metropolis, will become its suburbs; others, now a day's journey, will be removed to its immediate vicinity; and business will be carried on with as much ease between them and the metropolis, as it is now between distant parts of the metropolis itself.'" Vol. ii., pp. 239—264.

In presenting THE SKETCH to the reader *I earnestly call attention to ITS DATE.*

It was drawn up *in the early summer of 1836,—i. e. within four months of my brother's initial start at Heidelberg, and more than eight months before a scientific difficulty, respecting the proportions and arrangement of a voltaic-magnet and its coils, induced him on the 27th of February, 1837, to consult Drs. Faraday and Roget, and lastly Mr. WHEATSTONE.*

I am not unqualified to speak on this point, and may perhaps be permitted a passing allusion to the vivid recollections and intense interest, thus recalled, of a time, when I daily received my brother's plans in far greater detail from his own lips, and watched the slow construction of that Mechanical Instrument which the SKETCH describes.

THE SKETCH, as printed, was drawn up during that early summer, for submission to influential persons, with a view to the immediate practical introduction of the Telegraph, by my own pen, from the rough jottings by which, amidst his ceaseless and absorbing occupations, my brother secured on the moment the offspring of "a brain teeming with Invention."

The explanation of my rendering the only assistance in my power, by converting these jottings into the SKETCH, will afford a glimpse at the practical activity of the time. The system of intricate and most ingenious contrivances, which adapted my brother's

Mechanical Instrument to exhibit its 60 signals, one by one, at the rate of 1,000 to 1,500 per hour, rendered the construction of this novel organism a work of no common difficulty. The difficulty was greatly increased by the necessity of concealing the object of the yet unpatented invention—and still more so, lest the complete instrument should explain itself, by the further necessity of committing the constituent parts of the combination to different makers. The preparation of the elaborate diagrams, which this plan required, and the daily visits of inspection to the makers, distant both from each other and from himself, largely contributed to those demands on my brother's time and attention, which gave occasion for my pen. He first modelled every part accurately in wood.

Messrs. Moore, of Clerkenwell, employed for one part of this work, will be remembered as the makers to whom, at a later period, my brother entrusted the construction of one of those hatchment dials, (p. 38, *2nd note*,) which, when made, Mr. Wheatstone, at a favouring moment, exhibited for specification to Mr. Farey, as solely representative of the invention to be patented,—resenting, as useless intrusions, those original elements, which secured the patent to the partners, and the Practical Electric Telegraph to the World. (Pp. 29—31.)

THIS EARLY SKETCH has long since become a finished Picture, familiar to the eyes of all, as realized in that Practical Electric Telegraph, which “spreads its network of intelligence around the globe.” The reader, so prepared, will scarcely overlook—either the broad view, or the sure forecast—the practical purpose, or the practicable methods—the detailed plans, or the minute particulars—the vast conception, or the humane design—of the inventive projector.

It is pleasing to myself to mention that the project of giving assistance to the deaf and dumb, originating with the first conceptions at Heidelberg, was long a cherished object with my brother;—that, for a time, it was realized under his auspices, though afterwards resigned to his regret. It has been some compensation that large employment has been provided,—where of late years it has been so earnestly sought,—for female hands. A room has been set apart at the Lothbury Station for female clerks, who also perform the chief duties at several telegraphic stations. For this arrangement the public is, I believe, indebted to General Wylde, C.B.

THE SKETCH commanded the praise and admiration of Dr. Reynolds, in 1837.

Though “*unable to conceive how this power, or agency, could be applied to communicate signals to the extent required*,” that scientific man recognised, before trial, the mysterious “*essence of the invention*,”—the amount of “*thought and labour*,” which had been bestowed upon it—and “*the very ingenious contrivances*” which it exhibited—and he “*was particularly struck with the mode of detecting a place of injury to the wires*” by the DETECTOR. Page 97, *supra*.

The “*inconvenience*,” which he anticipated of “*neutralization of effect by simultaneous signaling*,” was wholly obviated by my brother's arrangements from the beginning.

The “*practical difficulties*,” which he foresaw, “*in maintaining a wire for many*

hundred miles in perfect integrity, and electrical isolation," were encountered in all their fulness by "WILLIAM FOTHERGILL COOKE, when he went out on railway lines to combat the mechanical, and other difficulties, inseparable from all new works." (Mr. Cromwell Varley, p. 42).

The amount of difficulty encountered by my brother in securing the underground insulation of the wires from intrusive damp, and the ingenious contrivances by which that difficulty was partially overcome, would fill a volume. His patented method of suspending the wires in the air, which, with its very superior advantages, superseded the result of these successful labours, demands a few words in this place.

The softness and costliness of copper rendered it unsuitable for the purpose of suspension, and the iron wire then used, in short lengths of a few feet, was found on trial to be of too brittle a quality. *On the invention of galvanised iron*, my brother immediately suggested the use of a better kind of iron for the manufacture of wire, combined with the process of galvanising, and the extension of wire drawing to much greater lengths. Being requested to become a director of the Galvanised Iron Company, he took the superintendence of the department and became the founder of this branch of manufacture, which, with the extension of the telegraph by land and sea, has received such large subsequent development. The insulators and winding apparatus, for suspension, were his inventions.

THE SKETCH was laid before the arbitrators in 1841. Its date was clearly established, having been submitted to Dr. Reynolds and others, in January, 1837. By a letter, twice referred to in the margin of Mr. Wilson's summary of evidence, I myself identified the bundle of loose papers, which contained the original jottings; and fixed, with precision, the date in the summer of 1836, when I drew them up into the Sketch. It was alone fatal to many of Mr. Wheatstone's claims, and greatly invalidated them as a whole. It was part of that "*conclusive documentary evidence, of which Professor Wheatstone had not the remotest idea.*" (See p. 10).

THIS EARLY SKETCH of the summer of 1836 makes no allusion to my brother's still earlier GALVANOMETER or MAGNETIC-NEEDLE TELEGRAPH of March in the same year. When constructing his Mechanical Instrument of which the SKETCH treats, he supposed that certain advantages peculiar to that wholly original and most ingenious Instrument, such as the requirement of only two wires and the representation of the letter or numeral to be given, would cause it to supersede the earlier form. The reader's attention is therefore directed to the Mechanical Instrument alone. That supposition has not hitherto been generally realized. His first combination, THE GALVANOMETER TELEGRAPH OF HEIDELBERG, being, with unessential modifications, that which has hitherto prevailed in this country.

THIS EARLY SKETCH clearly exhibits my brother as the originator of the undertaking by which the Practical Electric Telegraph was established; and, notwithstanding the omission of his Galvanometer Telegraph, goes far to exhibit him as the author of what is essential in the Instruments employed.

THE ARTICLE ON THE ELECTRIC TELEGRAPH IN THE QUARTERLY REVIEW FOR JUNE, 1854, the inspiration of Wheatstone, presents so sharp a contrast with the SKETCH in these respects, that notice of the former can not properly be omitted in remarks upon the latter.

A strong impression must have been formed in the mind by the one eloquent fact already noticed, that "In a Scientific History of the Invention of the Electric Telegraph, 'prompted exclusively by Wheatstone,' for an article in the Quarterly, the figure of the Professor 'stood alone' before the practised eye of the Editor, while revising that article for the press, and while actually doing justice with his own pen to certain 'foreign inventors,' whose 'claims,' being known to him, he further 'studied,' and found 'under-rated.'"—PREFACE, p. xii. The cursory notice of a few leading instances, cannot adequately convey the simple—inversion of truth—and trampling under foot of justice—which pervade the article in this respect; and for which Professor Wheatstone *only* is responsible. With this remark I proceed to make the following extracts from the Quarterly Review.

THE DETECTOR, which, as fully explained in the SKETCH, so forcibly struck the mind of Dr. Reynolds, and which, in practice, "was never out of my brother's hand," is nearly, if not quite, the only part of my brother's inventions which Mr. Wheatstone never attempted to claim. It might, therefore, have been expected that he would credit my brother in his article with this invention at least, especially as he asserts that "*He has on no occasion that he can call to mind, omitted to make liberal mention of Mr. Cooke.*" (Answer of 1856, vol. i., p. 86). It will be found, however, that this invention, whilst its usefulness is suggested for admiration, is attributed only to *human foresight* IN THE ABSTRACT.

"Suppose the wires should be damaged," says the writer of the article, "your whole line is paralysed; and how are you to find where the fault may be? Against these eventualities HUMAN FORESIGHT has provided; by testing from station to station the office soon knows how far the wires are perfect; if the injury be in the subterranean street wires, by the aid of testing posts at every 500 yards, the workman knows the place." *Number for June, 1854, p. 142.*

THE INVENTOR OF THE INSTRUMENT, AND OF THE METHOD, IS IGNORED.

THE INTERMEDIATE APPARATUS, "which forms by far the larger portion of every telegraphic line," and which contains under the simplest arrangement so much difficult and ingenious combination, is represented in the SKETCH by the numerous intermediate instruments attached to the wires. The "SWITCH," for diverting the course of the electric fluid, as forming part of that apparatus, is referred to, though not by name, at page 102, in breaking the connexion between the Government and public instruments. In a private notice, my brother says, "I introduced the Switch first on the Great Western, next on the Yarmouth and Norwich, next on the Portsmouth line to switch to Southampton, then on the Dover line. I christened it 'Switch' at Yarmouth. It is described at length in my own patent of 1838."

The particulars of the defeat of Mr. Wheatstone's claims to the Intermediate Apparatus, which the curious reader will find in vol. ii., pp. 171—179, must have left such indelible impression upon his mind, as well explains his declining the revival of them. The "Switch," though honourably mentioned in his article, is, therefore, only qualified as "*a curious contrivance,*" WITHOUT PARENTAGE.

In continuation of the foregoing extract, we read:—"Whilst all is being made right, A CURIOUS CONTRIVANCE preserves the communication. Everyone is acquainted with the railway 'switch' by which the train leaves one line of rails for another. The telegraph has its switch also." The article dwells on the subject, and points out that, when local storms obstruct direct communication, the electric current is "switched" through a fair-weather country.

THE INVENTOR OF THE SWITCH, AND OF THE WHOLE INTERMEDIATE APPARATUS, IS IGNORED.

I proceed to the statements in the article respecting the MECHANICAL INSTRUMENT and its PRINCIPLE OF ACTION.

OF THE PRINCIPLE OF ACTION IN THE MECHANICAL TELEGRAPH, IN ALL THE VARIED FORMS OF ITS DEVELOPMENT, Mr. Varley truly says: "It was Mr. Cooke who first applied the attraction produced by voltaic electricity to the descent of a clock-train, &c.—an important step in practical telegraphy."—*Supra*, p. 35. This principle was invented by my brother at Heidelberg, for his alarum, before he applied it to his mechanical instrument.

The article in the Quarterly, having mentioned Arago's discovery of the temporary magnetism of soft iron under the influence of a galvanic current, and the application of this discovery (my brother's application, as above defined by Mr. Varley), to the rapid working of a lever, continues, "*This is the principle of action in Wheatstone's electro-magnetic dial instrument,*" p. 122; which, it "predicts," will supersede the Needle Telegraph, now in use,—p. 130. This instrument was Wheatstone's improved *variation of my brother's mechanical instrument of 1836* (described in the Sketch). It was patented, TOGETHER WITH AN IMPROVED VARIATION BY MY BROTHER, in 1840. Page 31, *note*. Besides the "*principle of action,*" Mr. Wheatstone's *variation* borrowed many of the particular arrangements. In proof of this the original instrument was sent to his residence in Conduit Street. Of the relative merits of these two improved variations, as well as of their identity in principle with the original instrument, Mr. Wilson's Address states:—"Mr. Farey will explain, as a witness, *their essential identity of principle,* and *the great practical superiority of Mr. Cooke's last inventions.*" Vol. ii. p. 195. See also Tables to Plates, vol. ii.

Mr. Wheatstone, it will be observed, does *not* claim *the invention of the principle of action*. He *only* ignores the inventor of that principle, the *existence* of the inventor's original instrument, and improved variation, and the *strong opinion* of Mr. Farey as to the relative value of the new instruments.

The reader is left to infer that the instrument as a whole—its principle of action and all its arrangements—is the exclusive invention of Mr. Wheatstone.

is not easy to notice *any one blot* in Mr. Wheatstone's statements, without either failing in justice to the subject, or becoming involved in the notice of *other blots besides*. To complete this subject, it must be mentioned that the "separate rights" in connexion with his "variation of my brother's mechanical instrument," which, in one of the most unhappy of his many unhappy assertions, he proclaimed as the "substantial subject of the arbitration, &c.," see pp. 49—51, were *freely conceded* by my brother *before the instrument was shown to him, in reliance upon the Professor's assurance that it was entirely new and original*. That incautious promise was *afterwards confirmed* by my brother, *because made, although obtained "in the dark."* The concessions thus obtained in the dark—thus confirmed, in punctilious honour, although obtained in the dark—the Professor *attempted to extend beyond their defined limits*—and also *attempted to build definitively upon his possession of them those misrepresentations of his position with respect to my brother, which had given so much ground of complaint from the beginning, which rendered arbitration necessary, and which were by arbitration condemned*. It was this abuse which compelled my brother, *—though never receding from his incautious concessions—*to refuse to them the seal of legal ratification *until arbitration should have decided and publicly notified the relative position of the parties*. Vol. ii., p. 3.

I now proceed to the statements in the Quarterly respecting THE MAGNETIC-NEEDLE TELEGRAPH; viz.,—respecting the five-needle "Hatchment Dial" of Mr. Wheatstone, which was invented after the first patent was applied for, and which has never been used; and respecting my brother's perfected "Heidelberg Telegraph," the telegraph of the English railways; which is worked, sometimes with two needles, sometimes with one only. Pages 22—24, *supra*.

Respecting this form of the telegraph, the article states that—

"Professor Wheatstone *worked out the arrangements* for his telegraph, and, *having associated himself* in 1837 with Mr. Cooke, a *practical mechanic*, who had previously devoted much time to the same subject ("liberal mention of Mr. Cooke!") *a patent was taken out* in June that year in their joint names. *Their* Telegraph, &c.," p. 125. The reader of the SKETCH, and of the preceding LETTERS, will have formed his own opinion as to who that person is, who "*worked out the arrangements for the telegraph,*" and to whom the "AUTHORSHIP OF THE PRACTICAL TELEGRAPH" is to be ascribed. The amount of honour intended for Mr. Wheatstone's *co-patentee*, when what had already been described as "*his telegraph*" is graciously called "*their telegraph,*" will be inferred from the statement that Mr. Wheatstone "*had worked out the arrangements for his telegraph,*" (as the grammatical construction shows), *before* he "*associated himself with Mr. Cooke.*" The line intended to be understood as assigned to the "*practical mechanic,*" (the Indian officer, found engaged in scientific pursuits at Heidelberg,) will be inferred from his *designation*.

In continuation of this extract, we read:—

"*Their telegraph had five wires and five needles; . . . the modifications of this instrument, which is still in use, have been made for the purpose of rendering it*

more economical, *two wires* being employed, or *only one*." In the "five wires and five needles," the reader of pp. 22—24 will recognize Mr. Wheatstone's Hatchment Dial, which was not a *telegraph* at all, but simply a *telegraphic instrument*, and not "*their's*" at all, (except as co-patentees,) but Mr. Wheatstone's exclusive contrivance,—developed after his acquaintance with my brother had given him a telegraphic system, on which to engraft it—an ingenious and beautiful contrivance, but *never used*. "This instrument," (of which only two specimens and two models were ever made), the article informs us "*is still in use*." "So much the worse for the facts!" In the "two wires," and in the "one" wire, allusion will be recognized to "the telegraph of the English railways," viz., to the two elements, and to the one element, respectively, of the three separable elements of my brother's original Galvanometer Telegraph of Heidelberg. These two forms of my brother's original telegraph, almost universally adopted by this country from the beginning, are represented in the article, it will be observed, as "*modifications*" of Mr. Wheatstone's Hatchment Dial; and are stated to "have been *made on purpose* to render *it* more economical."

There is something not quite pleasing to the ear in the alternations between the singular and plural numbers, which occur in the words quoted. The ingenious reader will not find it easy to rival their efficiency in affixing Wheatstone's claims to Cooke's achievements, and in associating the whole with that Hatchment Dial, which was really Wheatstone's, but which "*has never been used*."

I conclude these remarks by noticing a few less important statements in the Quarterly.

My brother's experiments at Euston Square, where his second galvanometer and second mechanical telegraph were at work, before the invention of the Hatchment Dial, are spoken of in the *LETTERS*; pp. 36 and 37. The notice of these experiments in the article is:—"that Wheatstone put his own contrivance to the test on the North-Western Railway,"—p. 126.

At the same place, we learn that "*Mr. Wheatstone's patent* was taken out in June." "The liberal mention of the mechanic" was not to be carried too far.

"Mr. Cooke's" name, however, was not always forgotten; and, as Mr. Wheatstone's earnest struggle for priority had been condemned by arbitration, it is not surprising that he asserts it, where there is none to dispute his claim. We subsequently read, therefore, of "*Messrs. Wheatstone and Cooke's patents*;" p. 131.—(See *LETTER* iii., pp. 16 and 17; and again p. 18.)

These are *small matters*. It is an *infinitesimally* small matter, but withal suggestive, that when Mr. Wheatstone's friend, the Abbé Moigno, had occasion to mention the arbitrators, he placed the Professor's first. "*Des arbitres furent nommés; parmi eux figurent des noms célèbres, ceux de Daniell et de Brunel.*" It will be remembered that the knotty point, which, according to Mr. Wheatstone's "corrected version;" these celebrated men were convened to settle,—under a formal legal deed,—a point already conceded by my brother, was whether Mr. Wheatstone's name should figure alone, "*sur les appareils exclusivement inventés par lui.*" (Pages 49—52, *supra*.)

I make one more reference to the article in the "Quarterly."

The writer having denounced the present publicity of telegrams, as a "grievous fault," continues;—"Our own opinion is, that the public would much prefer the Dial Telegraph; (Wheatstone's variation of the mechanical instrument, before alluded to.) At all events, some simple yet secure CYPHER should be introduced. *We* have reason to believe that Professor Wheatstone has invented a cypher of this description, which has not yet been made public." There is not much difficulty in personifying the pronoun "we." It will be remembered that my brother contemplated secrecy *as the rule* "Inscrutable secrecy (he says), is obviously of primary importance in the mass of telegraphic correspondence." And that, amongst his realized inventions, in the early summer of 1836, was a very ingenious "'Round Robin' cypher," combining "endless variation" with "great facility." "This cypher has been lost." See p. 101, *note*.

After the "remarkable confusion" on Mr. Wheatstone's part, which has so largely extended itself from "dates and transactions" (p. 10, *supra*) to the not unimportant distinction between *meum* and *tuum*, I trust he will excuse my expressing the hope that, if "the cypher, which he has invented," is *ever* "made public," it will not appear that my brother's "Round-Robin" has by any accident hopped into his hand.*

T. F. C.

* After the above was written, a friend, to whom the manuscript was submitted, informed me that a very similar "ROUND ROBIN CYPHER," under the more imposing name of "CRYPTOGRAPH," was then in private circulation; bearing on its dial the inscription, "C. WHEATSTONE *invenit*."

No doubt even "*the inscrutable secrecy*" of the *original* "ROUND ROBIN CYPHER," extemporized in the early summer of 1836, has been improved upon, after an interval of thirty years, in the recent "CRYPTOGRAPH,"—a word *ominously* derived, as an accompanying paper informs the unlearned, from "*κρύπτω*, I HIDE."

A botanist might suggest that the word "CRYPTOGAM" would serve the purpose; if, as appears, there has been a very close, though unacknowledged, combination of originating ideas. The word "CRYPTOGRAPH" would then remain at large with the Author for application generally to his article in the "QUARTERLY REVIEW," and to the very large family of its congeners; which it would be convenient to classify as "WHEATSTONE'S CRYPTOGRAPHS."

As stated in my brother's second volume, p. 246, published in 1856, his "ROUND ROBIN CYPHER" Card, which accompanied his "SKETCH OF 1836," and was explained in its use therein, "has been lost"—"lost," as has always been supposed, in Professor Daniell's room at King's College, where the Arbitrators held their meetings—that "room adjoining Professor Wheatstone's," where Professor Daniell wrote his "enthusiastic letter." (Page 46, *supra*.) This "remarkable circumstance"—*inter alia multa et similia*, (see, e.g., pp. 6 and 29, *supra*),—remains to be explained.

"C. WHEATSTONE (*invenit*) HE FOUND"

is unexceptionable as an Inscription "*sur les appareils exclusivement inventés par lui*." (Page 51, *supra*.) It has been suggested, however, that this Inscription would be more complete, if he would subjoin as his Motto—

"ΚΡΥΠΤΩ, I HIDE"

APPENDIX C.

PSEUDO-CLAIMS TO SUBMARINE CABLE.

ON LETTER II., PAGE 8.

The "ENDERBY-ROPE" story would merit no further notice, had it not been made *the first link* of a fanciful "Submarine Telegraph Chain" of claims, by which Professor Wheatstone was to appear as the Originator at least of the IDEA of all Submarine Telegraphs.

My brother says, in his preface to the third edition of his Pamphlet of 1854, reprinted in October, 1866:—

"I understand that it is the invention of the Electric Telegraph generally, which Mr. Wheatstone is still claiming. But lest he should attempt to narrow the issue to the submarine application of the telegraph, I have given, in an Appendix, some extracts, which prove that neither the idea, nor the accomplishment, of submarine telegraphing is due to either of us." Page iv.

It is certain that the Enderby-Rope, for experiments across the Thames, *can only date from 1837*. See LETTER ii., p. 8.

It is also certain that—in the same year "*Baron Schelling ordered a submarine cable to be made to unite Cronstadt with St. Petersburg through the Gulf of Finland for Telegraphic Correspondence.*" See Dr. HAMEL, p. 69.

On the 14th August, 1747, "our countryman, Sir William Watson, had proved by experiments *across the Thames* that the water and earth were excellent conductors." See LETTER iv., p. 24.

The association of ideas, therefore, *between electricity and the Thames* was not new in Professor Wheatstone's days; and both Watson's and Schelling's proceedings must have been known to him in 1837, when Schelling was so far advanced in submarine experiments, as to order a Cable for the Russian Government.

"Mr. Cromwell Varley says:—"Baron Schelling seems to have been the first to construct a submarine telegraph under the river Neva, at St. Petersburg. It was he who constructed the first electro-magnetic telegraph, and in 1830 the Emperor of Russia saw it at work at Schelling's residence, when a distant mine was exploded by electricity before the Emperor." Letter to "The Dublin Express," November 21, 1866 (page 70, *supra*)

From the foregoing these two points are established :—

1st.—The origination of the idea of Submarine Telegraphy does not belong to Professor Wheatstone.

2ndly.—His early knowledge of scientific transactions abroad must have made him well acquainted with Baron Schelling's proceedings, when, in 1837, he or my brother, (it seems uncertain which,) proposed the "Enderby-Rope" for a Thames experiment.†

I proceed to the *second link* in Mr. Wheatstone's "Submarine Cable" claim.

This link dates *from the year 1840 to the spring of 1846*. The following particulars of a Rope constructed by my brother in the first of these years may prove material in connexion with this link.

I have before me my brother's account-book for the year 1840. Here I find, amongst other items in a bill of "The London Caoutchouc Company, 440 yards of *Galvanic Rope*, £66," with other charges for "wire, *Reel*, &c."

The history of this Rope is known to many persons. It consisted of fourteen wires, each of which was covered with India rubber, and the whole was bound together with a plating of cotton, saturated with water-proofing. The Rope was made by Mr. Sievier, under his patent, then worked by the Caoutchouc Company, at Tottenham.

This Rope, wound on the "Reel" above-mentioned, was kept in store on the Blackwall line, during a few months only, for occasional service, during repairs.

The fourteen wires of the Blackwall Telegraph were laid underground in iron pipes, in lengths of 440 yards (one quarter of a mile). At the end of each quarter-mile length there was an arrangement for detaching the wires. When a fault (generally from damp) occurred in any length, the occasional Rope was run off its Reel, and the ends of its fourteen wires, marked for recognition, were "joined up" at both extremities with those of the main line. The faulty quarter-mile length of wires was then drawn out of the iron tubing for repair. When this was replaced, the occasional Rope was once more coiled upon its Reel, and removed into store. By this means the Telegraph was never interrupted in its working.

Early in 1841 my brother completed a duplicate line of Telegraph wires on the Blackwall Railway; this occasional Rope was then superseded. Having been used for so short a time it was not charged by my brother to the Company, as appears by his account-books, but remained his own property.

It thus happened that *this Rope was lent to Professor Wheatstone for experimental purposes*. How long it remained in his hands, is not known. A specimen of this Rope had been given to him originally.

† When, "In December, 1837, Messrs. Glascott wrote to Wheatstone for payment for the wire for this Rope, he forwarded their letter to Cooke, observing that 'IT RELATED TO A TRANSACTION, OF WHICH HE HIMSELF KNEW NOTHING.'" LETTER II., p. 8.

The inconsistency of these words with his "mainly grounding on this Rope his claim to the invention of the Practical Electric Telegraph," has appeared in LETTER II. I here draw attention to that inconsistency in illustration of my brother's remark, that—

"M. Wheatstone always showed an equal readiness to throw off his share of risk in times of difficulty, and to claim his utmost share of benefit, when the difficulty had been overcome" Vol. I., PREFACE, p. x.

Professor Wheatstone was never consulted and had no part in making, or even in suggesting, this caoutchouc-covered rope.

These particulars having been stated, the Professor shall state *the second link* for himself.

As early as 1810, he tells us, in his "Note on the Submarine Telegraph,"—

"Having been furnished with the necessary hydrographic information . . . he prepared his detailed plans, which were exhibited and explained to a great number of visitors at King's College, among whom were the most eminent scientific men and public authorities.

"He also made the subject known in Brussels. In a notice of his new telegraphic instruments, by Professor Quetelet, published in the 'Bulletin of the Academie Royale de Bruxelles' for October 7th, 1840, it is stated,—'On sera sans doute charmé d'apprendre que l'auteur a trouvé le moyen de transmettre les signaux entre l'Angleterre et la Belgique, malgré l'obstacle de la mer. Son voyage se rattachait en partie à cette importante opération, qui mettrait l'Angleterre en rapport immédiat avec notre pays, la France, la Hollande, l'Allemagne, et même la Russie.'

"And in 'Le Fanal,' a Brussels paper of September 30th, 1840, it is observed, —'M. Wheatstone pense qu'il est possible de communiquer avec son appareil entre Douvres et Calais; il répète en ce moment ses expériences à l'Observatoire de Bruxelles, en présence de plusieurs savans litterateurs.'

"Mr. Wheatstone's plans were also shown in 1841 to some of the most distinguished men in Paris, who came to see his experiments at the College de France.

"The Abbé Moigno was in England in the spring of 1846, whilst Mr. Wheatstone's experiments were in preparation, and he published an account of what he had seen in 'L'Epoque,' of October in that year. This notice he afterwards reproduced in the first edition of his 'Traité de Télégraphie Electrique'† (Paris, 1849). It is as follows:—

† "Observing that Wheatstone quoted from the first edition of Moigno's work, and suspecting some sufficient cause, I turned to the Abbé's second, and to my amusement, if not to my surprise, I found that the grandiloquent clauses extracted by him in his 'Note on the Submarine Telegraph,' had given place to the following (p. 259):—

"M. Matteucci . . . indique . . . comment il comprend qu'on pourrait établir une communication télégraphique entre Calais et Douvres. M. Wheatstone avait eu avant lui cette idée.' . . .

"And again at page 582.—'Comme nous l'avons vu, la pensée de cette entreprise grandiose appartient à M. Wheatstone, qui dès 1847 avait tout préparé pour la réaliser.' Vol. i., p. 261, *note*.

The Abbé had, at the date of his second edition, began to suspect the Professor's Rope, so confined his claim to "cette idée."

"As time discloses facts, and truth matures," Professor Wheatstone's claims grow small. In further diminution the former part of this APPENDIX has clearly shown, that the "*idea*" even did *not* belong to him. The latter part will no less clearly show that "his complete preparations of 1847 (1846 ?) pour la réaliser," were simple failures. Ed.

"M. Quételet avait annoncé dès 1840, que M. Wheatstone avait trouvé le moyen de transmettre les signaux entre l'Angleterre et la France, malgré l'obstacle de la mer. J'ai vu de mes yeux, j'ai touché de mes mains le conducteur qui, en se reposant au fond des mers, unira étroitement les côtes d'Angleterre aux côtes de France. Ce conducteur est parfait, il remplira pleinement son but; tout homme sérieux qui l'aura vu et touché comme moi ne pourra pas même conserver l'ombre d'un doute sur un succès devenu palpable. Avant deux mois, des machines puissantes l'auraient produit dans toute sa longueur, mais partagé en section de deux kilomètres et demi. Huit jours suffiraient aux officiers de marine, qui s'y sont préparé par une étude approfondie, pour le mettre en place, et après quelques semaines † Paris et Londres se toucheraient; il n'y aurait plus ni abîme, ni distance, le génie de l'homme aurait tout vaincu." Vol. i., p. 258.

When, "in the spring of 1846," M. Moigno saw and handled "ce conducteur," Mr. Wheatstone was, and since the preceding autumn had been, under a conditional agreement with the Electric Telegraph Company. It is desirable to refer to that agreement and its results.

On the "3rd of October, 1845," he entered into that agreement, as the Company's scientific adviser, "at a salary of £700 a year," upon the understanding that, *inter alia*—

"A patent shall be applied for *immediately*, in order to secure Mr. Wheatstone's improvements in the mode of transmitting electricity across the water; that Mr. Wheatstone shall superintend the trial of his plans between Gosport and Portsmouth; and if these experiments prove successful, then in the practical application of the improvements to the purpose of establishing a telegraph between England and France."

The result of this agreement, after some twelve months' waiting, was simply this,—that "the Patent which it was understood Mr. Wheatstone should apply for IMMEDIATELY in order to secure his improvements, &c.," WAS NEVER APPLIED FOR AT ALL. He tells us that, during the interval, he was making "*an extensive series of experiments, and preparing the specification.*" † Vol. i., p. 108. The conclusion is obvious, and cannot be expressed better than in my brother's words:—

† In the "private revelations" to Moigno, "Paris and London would touch each other in a few weeks." The reader will find that the attempt to realize such a project was to be contingent on that success at Gosport, which—never came. Unhappily, the dreams of this lively imagination are adduced as facts.

‡ Before the present law came into force, an interval of six months was allowed AFTER an application for a Patent, prior to the specification being enrolled. After about nine months, Mr. Wheatstone withdrew from the Company on a misunderstanding with persons in the Company's employ. Vol. i., pp. 45—6.

The deceptive emptiness of the Professor's dreams, and of the hopes excited by those dreams, once proved, his connexion with the Company died naturally. Had his boasted "plans" been practicable, no

"If the fanfaronades in the Brussels' papers, in the Paris report, and finally in Moigno's work, collected together and published in his Appendix, represented real things, *I should have to complain of a breach of Mr. Wheatstone's engagements, under the DEEDS of 1837 and 1843, to make 'a full and open disclosure' to me of all his improvements, and to 'keep the same secret from all other persons.'* But I acquit him of any breach of agreement, for it is sufficiently evident that *he had not any invention to patent or to disclose.*" Vol. i., p. 260.

At Brussels in 1840, and at Paris in 1841, where "*he had himself made the subject known in print,*" he was supposed to have done great things; and the Directors of the Telegraph Company in October, like M. Moigno in the following spring, may have exclaimed, "*Le génie de l'homme!*" expecting to find him as strong in Facts as on Paper. But the Puffs in the Brussels and Paris papers originating exclusively from his own statements, like the Puff in the Magazine of Popular Science for March, 1837, of like origin, were merely "*scientific landmarks,*" "*publications ayant date certaine,*" for future reference.

In Professor Wheatstone's statements and quotations we hear much of his "detailed plans," of his "extensive series of experiments," of his "appareil," of "une étude approfondie," of his "great number of visitors," of "the most eminent scientific men and public authorities," "*que l'auteur a trouvé le moyen le transmettre les signaux malgré la mer;*" "*qu'il pense qu'il est possible de communiquer avec son appareil.*" &c., &c., just as in J. D.'s letter to "The Times," and in the speech at the Lord Mayor's banquet, we hear of the "distinguished auditories," who were "astonished by those private revelations at the London University," (a confusion with King's College,) in 1837, in which the Professor revealed himself as the sole author of the Practical Electric Telegraph *by land.*

But in all these glowing statements, where there prevails so much of that colour usually associated with the rose, there is *no description*—there is simply and absolutely nothing by which the reader can form a judgment, whether the Professor exhibited any original contrivance; whether what he exhibited as such was his own, or borrowed; or whether it was in any, or in what degree, practicable. The only clear fact is, that he never realized his "idea." There is eloquence in this pervading silence.

The only thing "*palpable,*" whether in the French or in the English language—*and this one thing HAS NEVER BEEN DESCRIBED*—is the Rope, "*ce conducteur,*" which in the spring of 1846 the Abbé Moigno "saw with his eyes, and touched with his hands,"

petty quarrel would have tempted him to resign the dazzling prospect before him—of realizing the idea of a Submarine Telegraph, with the resources of the Company at his back, or the handsome salary in his pocket. Nor, in such circumstances, would any trifling cause have induced the Company to resign the services of such a man. But the "Submarine Telegraph idea" was a repetition of the Professor's idea of a Telephone. "I thought that I had discovered the most efficient and economical means of establishing a telephonic communication between two remote points that could be thought of. My *ideas* respecting establishing a communication of this kind between London and Edinburgh you will find in the 'Journal of the Royal Institution,' for 1828." (Vol. i., p. 114.)

and fell into ecstasies at once, challenging the conviction of "every serious mind," as to its palpable success.

It is in reference to this "*conducteur*" that I have introduced the particulars of my brother's arrangements at Blackwall. And I now ask Professor Wheatstone, Where, and by Whom that "*conducteur*" was made? *What was the description of it?* Where is it now?—and finally, Whether it was not either a part, or the whole, of my brother's "Occasional Rope?"

It is quite possible that he may be able immediately to prove that the "*conducteur*" was his own, both by construction and by contrivance. By doing so, he will disabuse many minds of a very strong conviction to the contrary. I have the less hesitation in asking the foregoing questions, as he will have no difficulty in proving his claim to so novel a construction, if it was his indeed. If it was neither the "Enderby" nor the "occasional rope," at all events they were its only predecessors in England.

But the links which we have considered, are *not the last links* in Professor Wheatstone's "Submarine Cable-Chain." He now claims, through a leader in the *Times*, to be the man who has "joined the whole world in an instant of time." And not only so, but he also claims honours for these achievements at the hands of Royalty. And on what grounds does he build his claims? On these, namely, that "this claim was admitted by the French Jury in 1855, and by the report of the Government Commissioners on submarine telegraphs in 1862."

When in each successive testimony, where authorship can be traced—whether in home or foreign publications—whether in the Brussels or Paris papers, or in the *Quarterly Review*—from the note in the Magazine to the leaders in the *Times*,—when in each successive case we find Professor Wheatstone "stand alone," as the virtual witness in his own behalf—when we know how the Editor of the *Quarterly*, with whose mind we happen to be acquainted, "Relied unsuspectingly on the correctness of the article, because 'The Author of the Essay was prompted exclusively by Wheatstone (and that he) never considered the question as between (another) and Wheatstone, for the simple reason that he did not know that (that other) ever disputed the pretensions of the latter,'"—when we consider these things, we may be pardoned if we surmise that, when authentic evidence is weighed, not only the home and foreign publications, not only the Brussels papers and the *Quarterly Review*, not only the Magazine and the *Times*, but even the "French Jury and the Government Commissioners," will follow the notable example of Professor Daniell, when he, with such evidence before him, "as co-arbitrator with Sir I. Brunel, in his award of 1841, *revised and reversed the judgment*," to which in his letter of 1838 he had committed himself, in reliance upon the "*private revelations*" of Professor Wheatstone.—LETTER vii., p. 47.

T. F. C.

APPENDIX D.

PECUNIARY ARRANGEMENTS.

Professor Wheatstone has expressed dissatisfaction with the price that was paid to him by the promoters of the Electric Telegraph Company for the purchase of his interest in the patents. The facts relating to this subject are shortly as follows :—

“The terms of Cooke and Wheatstone’s partnership, which were more exactly defined and confirmed in November, 1837, by a partnership deed, vested in Mr. Cooke, as the originator of the undertaking, the exclusive management of the invention, in Great Britain, Ireland, and the Colonies, with the exclusive engineering department, as between themselves, and all the benefits arising from the laying down of the lines and the manufacture of the instruments. As partners standing on a perfect equality, Messrs. Cooke and Wheatstone were to divide equally all proceeds arising from the granting of licenses, or from sale of the patent rights; a percentage being first payable to Mr. Cooke as manager.” Award, *supra*, p. xxviii.

Such were the relative positions of the parties under the Award. But no profit was derived either from the joint patents of the partners or from the separate business of the originator.

“At the beginning of 1843” (says my brother in his Reply),* “we were at our lowest point of depression. The patents remained almost unproductive, and we had incurred, in various ways, a considerable outlay. . . . I was still indeed hopeful. . . . I had . . . introduced, under my patent of September, 1842, the cheap system of suspending the wires in the air, which has since followed the Electric Telegraph all over the world.

† Vol. I., page 213.

"But in the meantime further and increased outlay was indispensable. Having come to the conclusion that unless, with our own capital, we put up a specimen telegraph on the suspension plan, our disappointments might be endless, I had already obtained from the Great Western Railway Company the privilege of putting up and working for a term of years a telegraph to Windsor. It had been proposed that Mr. Wheatstone should either find half the capital required for this Windsor telegraph or cede to me . . . the right of putting it up on my own account. This I was willing to do in aid of the common enterprise, though I had no capital conveniently at command, and could not hope for a remunerative return.

"Mr. Wheatstone's account was already, to some considerable amount, indebted to me. He declined (I do not say improperly . . .) both my alternative propositions. What was to be done? To stand still was ruinous, and Mr. Wheatstone was not willing to move in the direction which seemed likely to open better prospects. Numerous meetings took place between us at the office of Mr. Wheatstone's solicitor. . . .

"In January, 1843, it was definitely proposed, at an interview at Mr. Richardson's office, that Mr. Wheatstone should assign to me his share in the patents for a fixed royalty. Before proceeding further, I caused Mr. Wilson* to write a letter to Mr. Richardson,† communicating without reserve all the information in my possession; suggesting causes which might add to the value then put upon the patents; and throwing upon Mr. Wheatstone and his solicitor the whole responsibility of fixing their own terms, upon their own judgment. The great importance of this letter justifies me in printing it entire, and in requesting attention to every part of it.

"1, COTHALL BUILDINGS, 13th January, 1843.

"MY DEAR SIR,—With reference to your conversation of this afternoon, on the subject of the proposed arrangement between Mr. Cooke and Mr. Wheatstone, Mr. Cooke wishes, for obvious reasons, to protect himself from all responsibility, and to prevent the possibility of future misunderstanding, by repeating in writing what he has already expressed verbally, viz., that Mr. Wheatstone must form his calculations independently, and be guided by his own judgment and yours in fixing the mileage which he would be willing to accept. Mr. Cooke will state equally independently, what he would be disposed to bind himself to give, and if there is any difference of opinion, it must be discussed; but it must be clearly understood as the basis of the negotiation that Mr. Wheatstone is not to be guided by Mr. Cooke's opinion, but by his own.

"Indeed, Mr. Cooke has already explained to you that he cannot give any opinion which would deserve to be depended upon. He thinks the value of

* Mr. Cooke's solicitor.

† Mr. Wheatstone's solicitor.

the patents for the Electric Telegraph depend entirely on the capital and energy, with which they can be worked out, and the cheapness with which the work can be executed.

“ ‘ Mr. Cooke proposes the following data for your consideration.

“ ‘ On the Blackwall line, the charge for the license was £100 per mile, for a distance of four miles or thereabouts.

“ ‘ On the Edinburgh and Glasgow line, the charge was only £100 for a distance exceeding a mile.

“ ‘ On the Leeds and Manchester, the same sum was asked but refused, and nothing was in fact paid for the license on that line.

“ ‘ On the Yarmouth and Norwich line, an agreement was made for a license at about £110 a mile, to be taken in shares, in consideration of Mr. Cooke's becoming a considerable shareholder, and paying the deposit on his shares before the bill was applied for, which deposit would have been lost if the opposition to the bill had succeeded. The charge for the license was found to be a serious difficulty, and the agreement, in consequence, has not yet been confirmed by the Board of Directors, who will probably require considerable modifications of it.

“ ‘ On the Croydon line, a proposed charge of £70 per mile was considered too high, and broke off the arrangement.

“ ‘ Difficulties of the same kind occurred on the Great Western.

“ ‘ The only estimate yet made of the value of the English patents was made when . . . (friends of Mr. Wheatstone's) proposed to purchase a share. Mr. Wheatstone then named, and Mr. Cooke approved £5,000 as the price of a quarter share; and it was afterwards arranged that the one-third share should be sold for £3,300 in cash and £3,300 out of the purchaser's share of the first proceeds. The purchasers were not required to produce any other capital; though their influence was considered of value. Upon this principle, if Mr. Wheatstone's half-share were valued at £10,000, it would, after deducting Mr. Cooke's percentage for management, be worth £9,000. This, you will recollect, was for England only, exclusive of the Great Western Railway district. The Telegraph was then in high repute, and two years and a quarter of the patents have since elapsed; on the other hand, recent improvements have diminished the cost one-half, and the introduction of single lines may render a telegraph indispensable.

“ ‘ The subject of the conversation of this day was, as I understood, as follows. In consequence of Mr. Wheatstone having several times expressed, on recent occasions, a wish to withdraw from all active interference in the patent business, and to leave Mr. Cooke entirely unshackled in his management, it was proposed that the patents for England, Scotland, and Ireland should be absolutely assigned to Mr. Cooke, he paying to Mr. Wheatstone a fixed sum per mile for every mile of telegraph laid down in the three countries under the patents, undertaking all legal and other expenses without contribution

from Mr. Wheatstone, and releasing Mr. Wheatstone from the considerable claims which he now has upon him; all future improvements being included in the arrangement; the line from Paddington to Windsor by Slough not being subject to mileage; and a license being granted to Mr. Wheatstone securing his separate privileges within distinct establishments. The mileage in Ireland to be one-third less than in England, as the parties are only proprietors of two-thirds of the Irish patents.

" 'I think we generally concurred this afternoon in thinking that if £50 were taken as the average price of one license with another, Mr. Wheatstone's mileage could not be fixed higher than £15. For his share of the £50 being £22 10s., only £7 10s. would remain to cover his share of Mr. Cooke's risks, and to liquidate his present claims, and remunerate the monied partner, if one could be met with. That is to say, there would be in fact only £15 in the whole to meet these contingencies.

" 'The question, then, for the consideration of all parties seems to be this. Whether £50 a mile be or not a fair average price for licenses in the three kingdoms? Mr. Cooke is clearly of opinion that the great diminution of the cost and difficulty of laying down the apparatus will require some considerable reduction, in most cases, in the price of the license. Even assuming that £100, or possibly above £100, might be obtained in some instances; there would be many other cases in which a very much smaller sum, or more probably an annuity terminable at any moment, would be all that could be hoped for. It is evident that in the case of a terminable annuity, Mr. Cooke might not even recover the £15 payable to Mr. Wheatstone.

" 'It is obviously for the mutual interest of the parties that the mileage reserved to Mr. Wheatstone should not be so high as to interfere with the most extensive development of the invention; and certainly a high charge, whether greater or less than the sum specified, would interfere proportionably with its extension in the cases likely to be the most numerous, namely, those in which the payment will be made by annuity.

" 'Should this arrangement be completed, Mr. Cooke's first object, after having finished the Windsor Telegraph, would be to get the Telegraph laid down on the Croydon or some other trunk line, even at prime cost, with the hope that it might be taken up and extended by the branches in a profitable manner. He openly declares that by a temporary sacrifice he hopes eventually to increase the value of the licenses, whilst he extends more widely the use of the invention. Should he be disappointed in his hopes, the risk will be his; to Mr. Wheatstone will be secured a moderate but safe return, which, under any circumstances, will probably be much greater, at all events for several years, than any profit which he can expect to derive from his share in the patents, under the present arrangement, and while the tastes and occupations of one of the present partners prevent his entering actively into the business.

" 'Mr. Cooke and I will meet Mr. Wheatstone at your office on Monday, at

twelve, as proposed, and I trust that this letter, by fully and openly explaining Mr. Cooke's sentiments, will facilitate our arriving at a definite understanding.

I remain, my dear Sir, yours very truly,

ROBT. WILSON.

" 'WILLIAM RICHARDSON, Esq.

" 'P.S.—Mr. Cooke particularly requests that you will favour him by sending Mr. Wheatstone a copy of this letter, that he may weigh the points suggested for his consideration before the meeting on Monday.' "

The parties afterwards met, and, under the advice of their respective solicitors, concluded an arrangement for the transfer of Mr. Wheatstone's share of the patents to my brother, in consideration of the relinquishment of my brother's claims on Mr. Wheatstone, and of his agreement to pay to Mr. Wheatstone a royalty per mile on his future operations.

This new agreement was embodied in a deed, dated the 12th April, 1843, the substance of which is thus stated in my brother's first pamphlet.*

" After reciting the patents and the original partnership agreement, it goes on to say, that 'the shares of the said C. Wheatstone in the . . . letters patent are subject to certain claims to a considerable amount, in favour of the said W. F. Cooke, for monies already advanced and paid by him . . . on account of the expenses of obtaining certain of the same letters patent and inrolling the specifications . . . and on other accounts.'

" Then follows a recital, that 'it having been found that the complicated character of the aforesaid arrangements has tended to impede the successful prosecution of the said inventions, it was lately proposed and agreed . . . that all the letters patent, . . . and also all . . . patents for improvements . . . should be absolutely assigned . . . to the said W. F. Cooke; and that in lieu of such interest of the said C. Wheatstone, . . . the said claims now affecting the same should be cancelled, and that there should be secured to him an allowance or royalty, in money, proportioned to the number of miles over which the said Electric Telegraph should be laid down by the said W. F. Cooke, his executors, administrators, or assigns.'

" The deed then 'witnesseth' that 'the said C. Wheatstone doth . . . assign . . . unto the said W. F. Cooke, his executors, administrators and assigns . . . the several letters patent . . . and all the privileges . . . thereby conferred, . . . and all the . . . shares of him, the said C. Wheatstone, . . . in . . . the . . . letters patent . . . To the intent that the . . . letters patent . . . may be henceforth the sole property of the said W. F. Cooke, his executors, admi-

nistrators and assigns . . . during all the residue of the respective terms of years granted by the same letters patent respectively, . . . and . . . during all extensions thereof. . . .'

"Further on in the deed I am bound, by pages of very stringent clauses, to account every January and July with Mr. Wheatstone for a royalty in his favour, on the operations of the preceding half-year, assessed at the following liberal rates :—

"For the first ten miles of Telegraph completed
 during the year - - - - £20 per mile.
 "For the second ten miles - - - - £19 per mile.
 "For the third ten miles - - - - £18 per mile.
 "For the fourth ten miles - - - - £17 per mile.
 "For the fifth ten miles - - - - £16 per mile.
 "And for all beyond - - - - £15 per mile.

"The deed concludes with a release to Mr. Wheatstone of the balance due from him to me."

In 1845, the late Mr. John Lewis Ricardo and other gentlemen proposed to my brother to purchase the patents, with a view to their being extensively worked by a company, to be formed by Act of Parliament for the purpose. My brother named a price, subject to Mr. Wheatstone's royalty. The promoters having requested my brother to learn whether Mr. Wheatstone would be disposed to sell his royalty, the following correspondence took place :†—

"KIDDEROKE, near Blackheath, July 31st, 1845.

"MY DEAR SIR,—The proposition I made to you yesterday for the commutation of your royalty over a large portion of England and Wales may be comprised in the following question :—For what sum paid down now will you commute your royalty over the whole of England and Wales lying north of the Thames from its mouth to London, and north of the Great Western Railway from London to Bristol, but not including the railway itself, which will remain subject to your royalty? Say the cash to be paid half within three months, and the remainder within six months more?—I have also to ask you, as a distinct proposition, whether you will accept the sum of £20,000 as a commutation of your royalty for England, Wales, Scotland and Belgium, and your share in the Irish patents—and also including the exclusive rights in Great Britain and Ireland, but not in Belgium,—£10,000 to be paid in four months from this date, and £10,000 six months later?

I am, yours faithfully,

WILLM. F. COOKE.

"P.S.—The latter proposition to include all cash settlements pending between

† Vol. I., page 223.

us at the present time. As you are, I believe, connected with others in the 'exclusive rights,' you can add £1,500 in addition to the £20,000 on that score.

"CHARLES WHEATSTONE, Esq."

"20, CONDUIT STREET, August 2, 1845.

"MY DEAR SIR,—I have thought over your propositions, and after due consideration have arrived at the following conclusions. I will commute my royalty on *all* lines in England (and Wales) for the sum of £20,000, the royalty on lines completed before the payment of the first instalment of £10,000, to be paid to me under the present arrangement. The grounds of my calculation are these:—1st, that thirteen railway lines, averaging 100 miles each, would realise to me the above sum: 2ndly, that at the rate even at which lines have been completed during the first six months of the present year, the sum I have named would be realised in four, or at the utmost, five years; circumstances may augment or diminish this income, but I consider the chances of increase and decrease equal; 3rdly, that whatever arrangements be made for the sale of the Patents to other parties, the agreement with them cannot affect lines established previous to the date of such agreement.

"If the Great Western Railway, and the portion of England south of this line and the Thames be excluded, I would fix the commutation at £16,000.

"I will for a further sum of £10,000, give up all my rights in Scotland, Ireland, and Belgium, with all my reserved rights under the English Patents; or I will make a separate arrangement for any one or more of these privileges.

"I wrote, by last night's post, to M. Quetelet, to ask when he leaves Brussels, and when he returns; if it be possible to arrive there a few days before he leaves, I will start directly; but it will be of no use for me to be in Belgium when my most influential friend is absent.

Yours faithfully,

C. WHEATSTONE.

"W. F. COOKE, Esq.

"P.S.—These propositions to be of no effect unless agreed to within a month from the present date.

C. W."

The royalty was eventually purchased on the terms proposed by Mr. Wheatstone. Pending the negotiation, my brother had occasion to request an extension of the time during which Mr. Wheatstone's offer of sale was to hold good. His request was made by a letter to Mr. Wheatstone, commencing as follows;—"I have received an order for the Dover line,—a circumstance very much in favour of the immediate formation of a telegraphic Company.†

† See the letter, vol. i., page 228.

On the facts which have been stated, my brother made the following comments in his Reply:†—

“If then there was no concealment, and especially if (as I have shown) gratuitous information was afforded on points affecting the value of the royalties, Mr. Wheatstone would have no just cause of complaint, even if it were true that I had thought fit to ask for myself a higher proportionate price than that which he thought fit to ask for his separate interest. Let it be remembered that for two years our common interest had entirely ceased; that the patents were exclusively mine to deal with as I chose, subject only to a fixed royalty on the work annually executed. The long letter which preceded the arrangement of 1843, shows that it was Mr. Wheatstone’s wish, not mine, which led to his retirement; that he parted with his share of the patents upon the fullest information that I could give him; on terms fixed by himself and his solicitor; after a caution on my part that I disclaimed all responsibility for his decision, and an open avowal of my intention to make the patent property more valuable, if I could, by increased energy and outlay, I afterwards laid out, independently of other large expenses, at least £10,000 further capital on telegraphs remunerative only in prospect. I paid to Mr. Wheatstone, out of my own private means, more than £1,500 royalty on the Portsmouth telegraph. It was my invention of the system of suspension, to which Mr. Wheatstone never laid any claim, and which reduced the expense of a telegraph something like 60 or 70 per cent., which at length crowned my labours with success. The active speculation in the year 1845, coinciding with the advantageous contract for the Dover line, and other opening prospects, raised the value of the patent property to an unexpected height. Now, if under these circumstances I had sold, ever so advantageously, the patent rights which by Mr. Wheatstone’s request I had taken over, and my highly remunerative engineering department, why should Mr. Wheatstone have grudged me a well-merited and long-deferred reward for my perseverance and enterprise? I was not buying him out, in order to resell his rights at a profit. I was the owner of the patents, subject to a fixed encumbrance. I offered them for sale, subject to the burden, at a price mainly estimated on works in hand and in prospect; and it was the purchaser from me, not I myself, who offered to buy the royalty. I was not, as the Professor represents, an agent of his. I had no interest in the matter, except so far as the terms of purchase might affect, in some trifling degree, the value of the shares which I was afterwards obliged to take in the Company. I conclude, then, that I had a right to ask what I pleased as the price of what belonged to me, and that Mr. Wheatstone has no right to make comparisons between his price and mine, or to call upon me to enter into any explanation on the subject.

“But,” my brother proceeds, “I have no objection to give the fullest explana-

† Vol. i., page 229.

tion. The disproportion which I have assumed, for the sake of argument, had no real existence. Mr. Wheatstone was paid in a higher ratio for the prospective benefit of his royalty, than I was paid for the prospective benefits of the licenses, and of the extensive and lucrative contracting business, which my invention of the cheap mode of insulating the wires by suspension had enabled me to establish."

By accounts set out in the Reply,† it is shown that Mr. Wheatstone received for his royalty £33,219 in cash; and that my brother received for the patents, and for his valuable business as telegraphic engineer and contractor, together with a guarantee respecting the Scotch and Irish patents, and an obligation of gratuitous service, £91,158, *the whole of which was contingent*, being partly dependent on profits, which might not have been made, and partly paid in shares, which for years realised no dividend and were not negotiable, and which were subject to calls, that were made, to the amount of £136,500.

The Reply shows, by calculations, first, that, comparing Mr. Wheatstone's benefits with my brother's, the price paid for the royalty was proportionably too high; secondly, that it was intrinsically too high; and, thirdly, that, even supposing the royalty arrangement not to have been made, Mr. Wheatstone received more than what he would have been entitled to under the earlier arrangements.

In 1866 my brother reprinted his first pamphlet, with an appendix, which gives a copy of the actual proposition that led to the establishment of the Electric Telegraph. It shows that on specified works in hand my brother expected to earn, *as contractor*, £56,366; and it concludes as follows:—

"All the above interests I propose to bring into the common account; and, as a proof of my confidence in the correctness of my estimates, I am willing to retain them at the amount of £56,000.—WM. F. COOKE."

† Vol. I., page 232.

POSTSCRIPT.

"FACTS ARE MORE CONVINCING THAN ARGUMENTS."

The friends of Mr. Fothergill Cooke, as fully justified by FACTS, still demand of Professor Wheatstone, in the concluding words of Mr. Cooke's letter of the 6th November last, the withdrawal of the Professor's often-repeated INSINUATIONS. In that letter Mr. Cooke writes:—

"With these figures before you, do you continue to be dissatisfied with the £33,219 cash received by you, without expense or risk, in payment and in purchase of your royalties? IF SO, PRAY MAKE ME ACQUAINTED WITH THE GROUNDS OF YOUR DISSATISFACTION." (Page 66, *supra*.)

They adopt the sentiments of "G. H.," as thus expressed:—

"That a tacit acknowledgment *does not* harmonize with their views of honesty; and, further, that every day he allows to pass without making the tardy *amende honorable* tends to confirm the growing belief that Mr. Cooke has been defrauded of his title to public recognition, and establishes a painful stigma upon the reputation of Mr. Wheatstone." (Page 75, *supra*.)

Until a suitable answer be given to these demands, they must continue to urge upon Professor Wheatstone the language of "Amicus," as follows:—

"Refer to Mr. Cooke's letter of the 6th November. Begin with the words, 'In 1854, I fixed you as a party to insinuations then current,' and read, with the feeling and conscience of a gentleman, down to—'if you continue to be dissatisfied, pray make me acquainted with the grounds of your dissatisfaction.' His concluding words are also worthy of your attention:—'There is no escape from this dilemma, and though it is now, as I long since warned you it one day would be, beyond your power to do me justice without dishonour to yourself, a frank confession of your error will attach to your well-known name a less enduring stigma.'

"I think, Mr. Editor, that the above ADVICE is sufficient for the *present* occasion; but, if it be thrown away, I may again ask admission for more FACTS, unaccompanied by advice to the Professor. Mr. Cooke may take this question quietly, but his friends are resolved to bring it to an issue, and they all feel deeply indebted to you for opening your columns to the discussion." (Page 90, *supra*.)

The advice has been thrown away. The FACTS are in THE FOREGOING PAGES.

With the view of bringing the more prominent of these FACTS to particular and decisive issue, Mr. Cooke's friends put the following Questions to Professor Wheatstone, and await his reply:—


1. Why has he remained silent since receiving Mr. Cooke's letter of November 6th, 1866, (see page 63.) a letter—so serious in its charges against him—so sustained by published evidence—so manifestly requiring an answer?

2. Why has he neglected the forcible reminder of "G. H." on December 1st, p. 75, and of "Amicus," on January 12th, p. 88, warning him that his silence "does not harmonize with honesty, and that it establishes a painful stigma upon his reputation?"

3. Is the Professor's quotation given, p. 86, (and p. 53, *note*, and p. 273, vol. i.,) "a fair specimen of the *usual accuracy* with which scientific men quote private letters sixteen years after they are written, on the chance of there being *no copy preserved*," when they have an object to serve?

4. If the Award be true,—why does he not act in accordance with it? Page 66.

5. If the Award be false,—why did he cordially attest its truthfulness before the Arbitrators? Pages xxix., and 66.



6. Why does he persist in asserting a date for the "Note in the Magazine," disproved by the Award? LETTER ii., p. 5.

7. Why does he not withdraw his disproved statement about the "cross-Thames experiment?" LETTER ii., p. 7.

8. Why does he not withdraw his disproved claims to the Submarine Telegraph in favour of those who merit the honour? Page 111.

9. Why does he not withdraw—and correctly replace—the very deceptive "Continental version" of the Award, supplied by him to Moigno, instead of throwing that duty on Mr. Cooke's friends? LETTER vii., p. 51.

10. In support of his "Private Revelations" for the "French Jury"—for the "Government Commissioners"—for the "Eminent Auditories at King's College, Paris, and Brussels,"—can he supply some "other testimony than his own," when testifying of himself?

11. How can he justify the secret representing of the "Memorandum" as the Award of the Arbitrators? LETTER vii., p. 50.

12. How can he justify the clandestine use of Professor Daniell's private letter to undermine or set aside the Award? LETTER vii., p. 47. Page 40, vol. i.

13. As he triumphs in the destruction of the first 1,000 copies of the Arbitration Papers, let him say—whose shame were they burnt to cover, in 1841?—whose cause were they reprinted to support, in 1856? PREFACE, p. viii.; LETTERS, ii., p. 10; and vii., pp. 49 and 53.

14. How can he justify his representing the Two-Needle Telegraph of Great Britain as a cheap modification of any of his own Instruments? Page 109; and LETTER iv., p. 21 throughout.

15. What parts of the Practical Electric Telegraph can he prove to be his own? LETTER v., pp. 27, 32, and 33; and pp. 120, 121.

16. How can he explain his conduct respecting the specification of

the first Patent of 1837, *LETTER v.*, p. 30; and the taking out of the second Patent by Mr. Cooke, in 1838? Page 31.

17. Can he give a better reason why Mr. Cooke's name was placed first in the first Patent in his (Professor Wheatstone's) handwriting, than "that it was effected without Mr. Wheatstone's assent?" Why was it also first in the Partnership? *LETTER iii.*, pp. 16, 17.

18. Why did he, (Professor Wheatstone,) pay the *larger* sum for a subordinate interest in the first Patent? *Ibid.*

19. Why was allowance made to Mr. Cooke—and only to Mr. Cooke—for the expense of "past experiments?" *Ibid.*

20. Why were all the "exclusive" benefits from engineering, from laying down the wires, and from the sale of Instruments, and why was the "exclusive management," "vested" in Mr. Cooke, as a prescriptive right, unless he was the Originator of the Practical Electric Telegraph, and so "Entitled to stand alone"—whilst Professor Wheatstone was only the Scientific Adviser, Joint-inventor, and Co-patentee? *AWARD*, p. xxviii.; *LETTERS*, pp. 11, 12, 18—20, 33—34 and *note*, 37—44, and 53; and *APPENDICES*, pp. 61, 62, 70—71, 74, 76, 79, 81, 83—85, 91—95, 97—104, 120 and 121.

21. What does he say to Mr. Cooke's "SKETCH" of a Practical Electric Telegraph—*drawn up in the summer of 1836*—advanced as Evidence before the Arbitrators in 1841, (p. 22, vol. ii.,) and published in 1856? Vol. ii., pp. 239—264; and *APPENDIX B*, pp. 97—104, *supra*.

22. How does he explain the smaller but curious circumstance of the "Round Robin Cypher" of 1836 and the "Cryptograph" of 1867? *APPENDIX B*, p. 110.

23. If the Article in the "Quarterly" was "prompted exclusively by Wheatstone,"—Why did he not do justice to Mr. Cooke? Why did he withhold the Award from the Editor? Why did he claim all the glory for himself? Why did he directly disparage Mr. Cooke?

24. If the Article in the "Quarterly" was not "prompted exclusively

by Wheatstone,"—Why does he not rebut the charge, and demand the proofs? PREFACE, p. xi.; LETTER vii., pp. 52—54; APPENDICES, pp. 64; and 106—110.

25. The Article in the "Quarterly" gives the honour "exclusively" to Wheatstone.

If the Article in the "Quarterly" was "prompted exclusively by Wheatstone"—

Is that such evidence as a scientific man can appeal to with Arago's sanction?

26. Why does he not act on the advice of "Amicus,"—to "admit frankly and promptly any error made by himself, or by his friends in his behalf"—and to "deny explicitly, if he can, the charge respecting the 'Quarterly,' as one of the most damaging charges against him," in the opinion of honourable men? APPENDIX, p. 90.

27. Since persistence in an unjust charge, after it has been disproved, cannot consist with "honesty," Will he either withdraw or justify his often-repeated "INSINUATIONS" respecting money-transactions, or—if "still dissatisfied with the £33,219 received in cash without expense or risk," will he comply with Mr. Cooke's direct request in his letter of November 6th, p. 66, by "making Mr. Cooke acquainted with the grounds of his dissatisfaction?"

28. Has Professor Wheatstone any escape from the various difficulties and dilemmas suggested by the foregoing Questions?





1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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